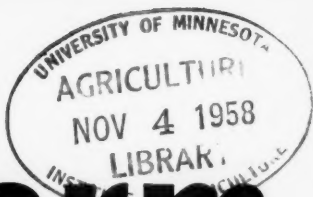


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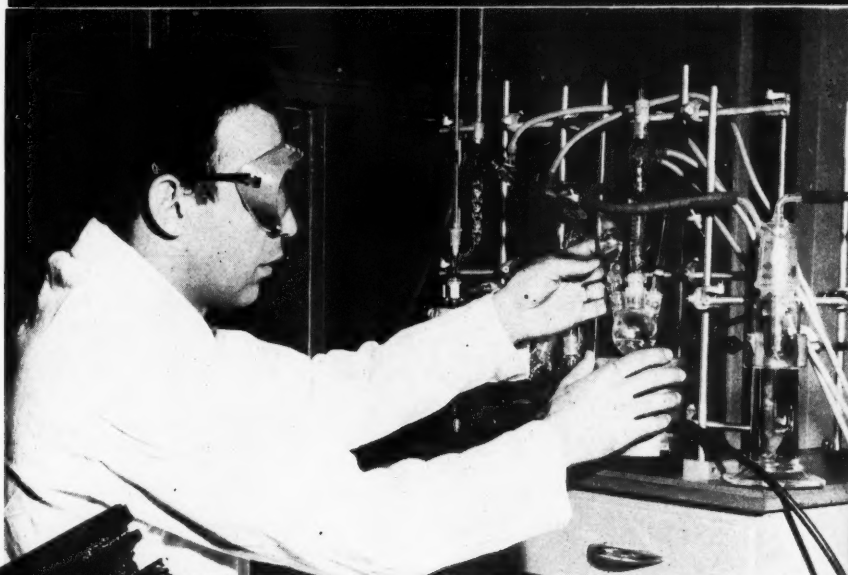


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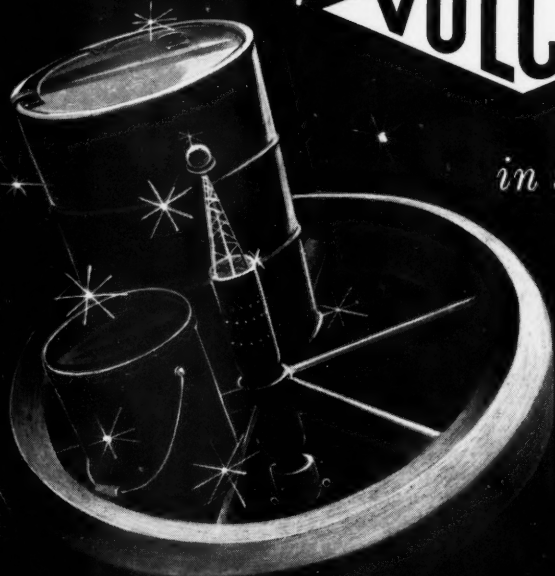
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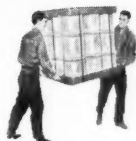
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THE COVER

The drama of man's struggle against agricultural pests is as long as the story of man. The men on the cover have leading roles in the current act of that drama. Entomologist SPIRO J. LOULOUDES (top) synthesizes a compound to carry a stable isotope of hydrogen, deuterium, one of the tracers used to study the metabolism of insecticides. Knowledge gleaned from such fundamental research forms the very roots of all efforts to develop better chemical weapons for farmers like STANLEY HATHAWAY, Vermillion county, Ill. He knows what it is to have a crop virtually destroyed by armyworms. What he learns from this personal introduction to his mortal enemies will surely make him a better farmer—more aware of the low cost of insecticides when properly applied at the right time. He's likely to reflect that having potent weapons is a good thing in this day of intensive crop management. His teacher, DR. GEORGE C. DECKER, is a well-known representative and spokesman of that corps of dedicated life scientists who, from the frontiers of research, tell agriculture and industry what they *must* know to fight the winning battle. (Be sure to read his essay on page 30, "A Pandora's Box of Problems.") We are indebted to MR. CHARLES T. MYERS, JR., of USDA, for his expert assistance in selecting the photographs.

ON AN ANNIVERSARY, A LARGER RESPONSIBILITY

It is our responsibility to Stanley Hathaway and his brother husbandmen around the world to tell of the pesticide industry's keen sense of responsibility. If that seems like a too heavy use of one word, think about it for a bit. Is it not partly a failure to communicate with the public and its legislatures that has caused the official rumblings John Harms has heard? (see page 23) And what is it that has not been communicated? The full story of this industry's keen sense of responsibility, which is a story of research and development—the cooperative efforts of physical and life scientists in government, private institutes, universities and industry.

Therefore, it is the story of expense: capital invested in highly trained and dedicated men, whose efforts may result in weapons devastating to man's universal non-human enemies, while safe to man when used correctly.

It is also a story of service, for neither capitalists nor scientists can be sure of success while they plan and work. And when they do come up with a promising pesticide, it must undergo painstaking, rigid and expensive testing, so that there will be no doubt about its initial and residual effects on plants and animals.

Now it is vitally important that this intrinsic sense of responsibility is expanded to always include communicating. "Eternal vigilance is the price of liberty." Thomas Paine wrote of man's most noble cause: achieving liberty under law. And this is a noble cause: maintaining a climate in which the industry can serve and prosper—without undue restrictions based on ignorance and fear.

The core of our responsibility is this: *The pesticide industry's "public relations" must not be permitted to become identified—by farmers and the rest of the public—as merely self-serving propaganda.*

LEE WILCOX

Farm Chemicals

Vol. 121 No. 11 November 1958

PIONEER JOURNAL OF THE INDUSTRY

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FARM CHEMICALS

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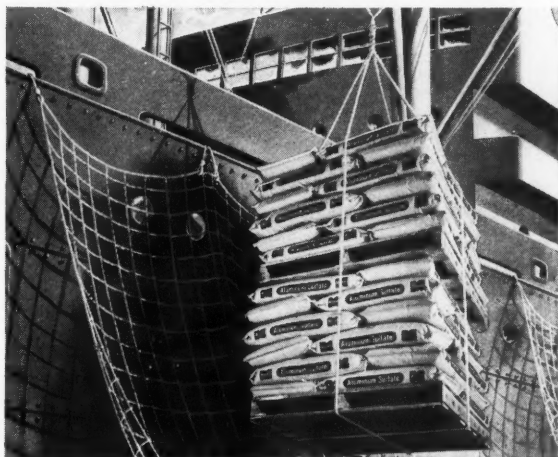
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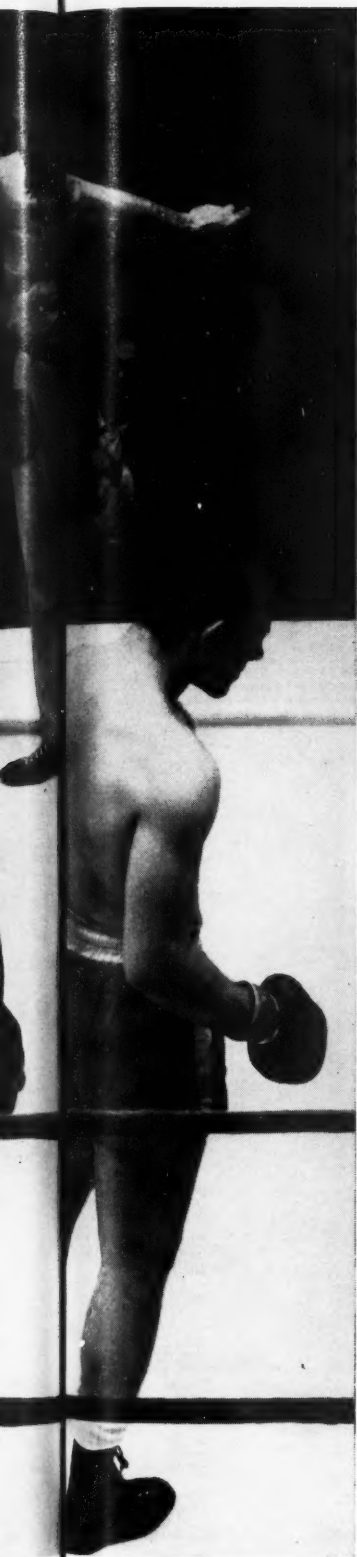
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VIEWING WASHINGTON

with Farm Chemicals
Washington Bureau

on agriculture

A boom in cotton insecticide sales may be in the making. Two reasons for this are (1) a big increase in planted acreage expected next year, and (2) a new federal program designed to knock out the hungry boll weevil. If your line includes chemicals which are effective against boll weevil or the host of other cotton-damaging insects, the potential for increasing sales is in sight.

Cotton acreage is expected to go up 5-6 million acres in 1959 to about 20 million, as a result of the new farm law. (See FARM CHEMICALS, October). Prices this fall are the best in several years and growers will take advantage of easier production controls to get more of the fiber. Furthermore, next year is only the beginning of bigger acreage. The days of rigid restrictions on acreages in cotton apparently are a thing of the past—at least for the next few years.

Even though USDA has reduced the cotton allotment from 1958's 17.4 million acres to 16 million in 1959—the new law permits growers to increase plantings 40% above the allotment. Big producers are expected to take this opportunity to expand acres.

The anti-boll weevil program is underwritten by a new \$125,000 fund provided by Congress. It is designed to find "better means" of controlling this pest—which causes cotton losses estimated at about 1/3 of a billion dollars annually. Top government, cotton industry, and state research people now are considering the needs of a comprehensive research program. Indications are that the government prefers to develop a program designed to eradicate the weevil—if at all possible. This program means: (1) a race to develop better insecticides, (2) bigger sales potential for those now on the market, (3) a new government-sponsored drive to sell insect-destroying practices.

Corn growers will vote to end acre allotments in the referendum to be conducted November 25. Their choice is between continuation of the allotment program plus support at 75% of parity, and no allotments with support at 65% of parity for 1959. No one in Washington believes they'll vote to continue allotments which have never been effective anyway. It means an increase of anywhere from 4 million to 7 million acres over this year's 74 million planted. This expansion should place more emphasis on protection of the larger crop through efficient pesticide and fertilizer use in the Corn Belt.

It also means a better farm chemicals market for corn in areas outside of the major production region. Under the

VIEWING WASHINGTON

agriculture continued

new farm law, all producers will get the same level of price support (assuming growers vote allotments out). The arithmetic cuts price support for the Corn Belt from \$1.36 a bushel down to about \$1.10. But in "fringe" areas—South and West—it means support rates will go up to \$1.10. Particularly in some Southern states, this means a boost of about 25¢ a bushel over present levels.

New restrictions on ammonium nitrate shipments may be in the making—as a result of the Texas City explosions of 11 years ago. Even though the government has since tightened regulations on shipment, transport and storage—ports and cities where ammonium nitrate is handled continue to seek tighter controls.

Port of Baltimore is the current outstanding example. There, the City Council is pushing an ordinance calling for tough restriction on ships entering the harbor with AN aboard whether loaded or unloaded at the port. It also is concerned about the amount of AN in mixed fertilizer. Baltimore is third largest East Coast port in point of tons handled.

Federal rules, administered by the Coast Guard, cover only loading and unloading. CG says it's had no trouble since these rules were imposed in 1954. Agitation for tighter regulations comes from labor (which wants high hazard rates for handling), City Fathers who "don't want another Texas City," and, according to indications, explosive manufacturers.

Big question: Will ammonium nitrate eventually be classed as an explosive? If so—higher freight rates are sure to come.

The recent jump in farm prices reported in the Agriculture Department's price index should not be used as a basis for sales plans. Don't build hopes on it—for economists say it was a freak. Not all farmers benefitted, and declining prices the rest of the year are likely to wipe out the September gain.

About half the boost was accounted for by grapefruit and oranges—the rest in beef cattle, eggs, milk, and cotton. The citrus price increase reflects off-season marketings when few go to fresh market. Milk price rise is seasonal and levels still are 4% below last year. Egg price boost already has been wiped out. Cattle and cotton price rises, however, are genuine. Growers of both will make more money this year—and next. That's where farm chemical sales efforts should be directed.

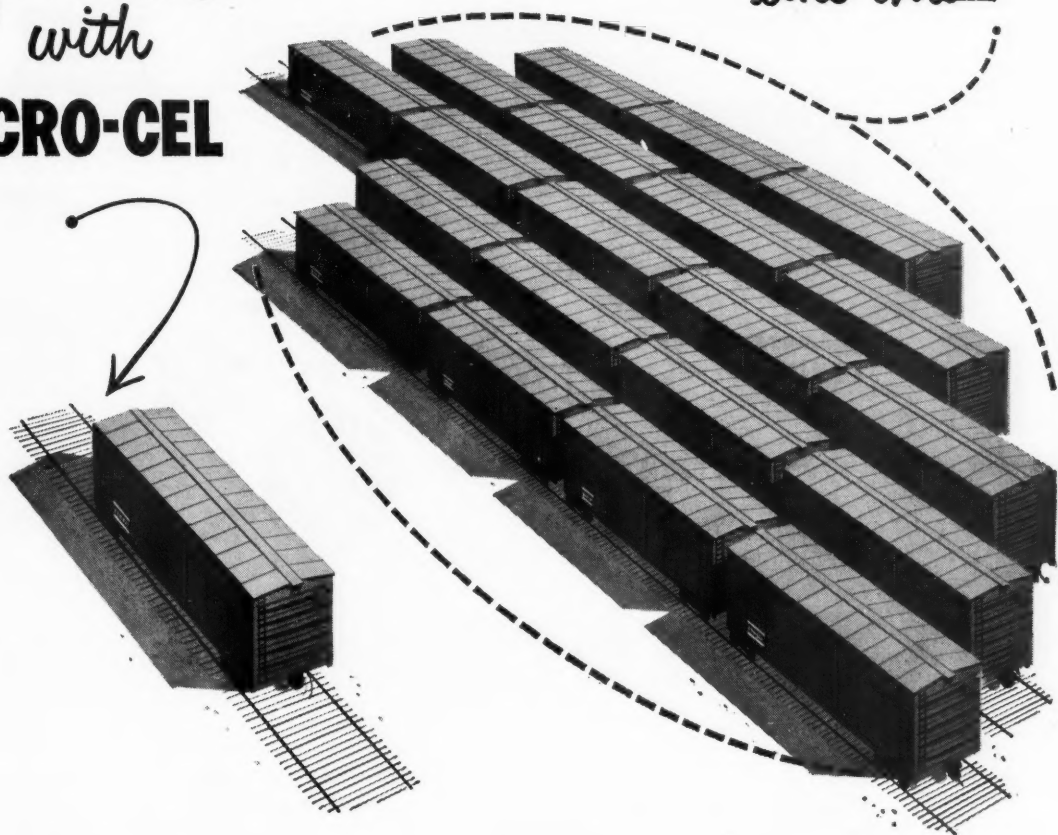
Farm income, over-all, this year will be up, by about \$2 billion. This means more spending by some farmers—primarily those producing cattle and hogs. Grain prices are lower, but volume from record crops will offset at least some of the price decline.

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This shipment of 50%
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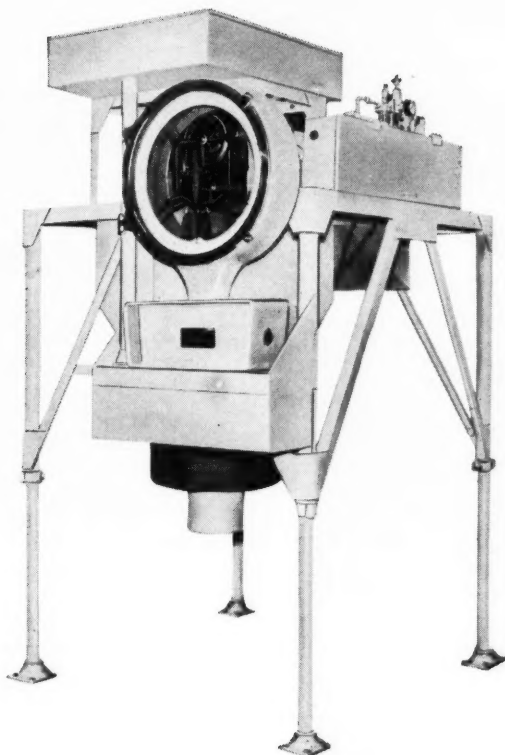
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This trend to Union's I & C Bagger began almost as soon as the unit was introduced. The first completely automatic pre-weighing machine for open mouth bags, Union's I & C Bagger made possible great savings for the fertilizer industry—savings in increased production and reduced labor, and savings through the use of a lower cost bag. And, the I & C was the first machine designed specifically for ease of installation—featuring lower head room and requiring floor space of only 5' x 5'.

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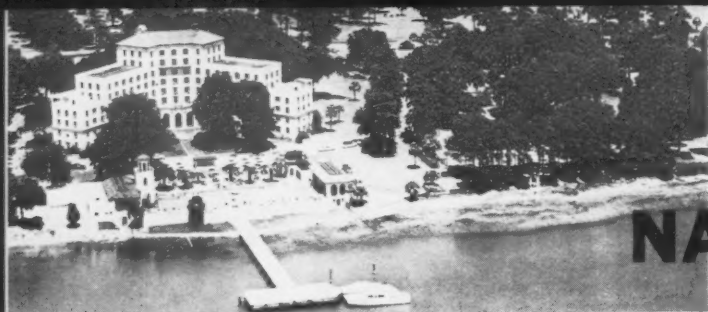
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THE PANELS

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The Hon. Phillip Alampi



Dr. Cynthia Westcott

Stephen G. Pugh



New and Expanding Markets

(Moderator: Jack Dreessen)



W. J. Garmhausen

J. W. Johnson



Dr. H. L. Haller

M. W. Melander



Looking Ahead

TWO MAJOR CHARACTERISTICS of the growing pesticide industry are its new and expanding markets and its public relations problems. Opportunities in these two areas of management activity are major themes of the National Agricultural Chemicals Association's silver anniversary meeting at the General Oglethorpe Hotel in Savannah, the last three days of October.

NAC members and guests can listen to panel discussions of the two vital topics, which are assuming ever more important roles as the scope of the industry's marketing and information efforts is widened to include more people who are not farmers, but who may be potential customers, and certainly have opinions of pesticides.

The shift to a wider market and audience for the industry's products and message accompanies three broad concurrent trends:

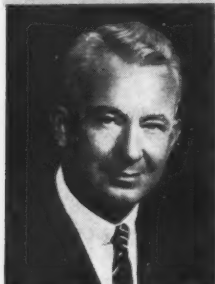
- ▶ farmers' increasing acceptance of farm chemicals as a basic factor in efficient management
- ▶ new and expanding markets—including roadside maintenance, forest protection and public health
- ▶ persisting public misunderstanding of, and antagonism toward, chemical pest control and eradication programs conducted by private business or government agencies

This transition—from serving mainly agriculture to serving even more directly the non-farm public—is not surprising when we consider one factor alone—the extent of research and development activity. This year the industry is spending an estimated \$20 million on new and improved products.

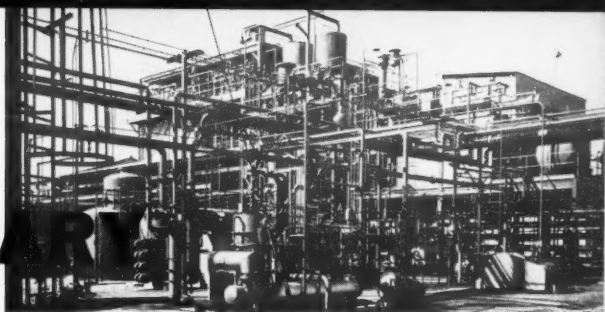
Liability for these products, and older products, will be discussed at the meeting by John Connor, representing NAC counsel, which prepares an annual summary of all product liability cases.

Other speakers and features (besides golf) on the program are announced on this page.

SPEAKERS include John L. Gillis, The Hon. Herman E. Talmadge and Frank S. Washburn.



S SILVER ANNIVERSARY



Looking Back

THE 14 CHARTER MEMBERS 25 YEARS LATER: On page 14, W. W. Allen tells a little about what has happened in The Dow Chemical Co. since 1933. Certainly you know where Dow, California Spray-Chemical Corp., Chipman Chemical Co., Sherwin-Williams Co. and Grasselli Chemical are today, but did you know that:

- American Nicotine Co. is believed by NAC to be out of business.
- Bowker Chemical Co. has been merged into American Agricultural Chemical Co.
- Latimer-Goodwin Co. was purchased by DuPont in 1944 and operated by the Grasselli Chemicals Dept. until December, 1946 when facilities were dismantled and the land sold.
- Mechling Brothers Chemical Co. is now a part of General Chemical Div., Allied Chemical Corp.
- National Sulphur Co. was acquired by Stauffer Chemical Co. about 20 years ago and operated as a division for a few years. Now a part of Stauffer, the National Sulphur Co. name has been discontinued.
- New York Insecticide Co. is believed by NAC to be out of business.
- Pittsburgh Plate Glass Co. is not in the pesticide business under that name, but carries out pesticide activity as Corona Chemical Div. and as Columbia-Southern Chemical Corp.
- John Powell & Co. is now a part of Olin Mathieson Chemical Corp.
- Tobacco By-Products & Chemical Corp., after several management changes, was taken into Diamond Alkali Co. Diamond Alkali sold the small package line to a new concern—Black Leaf Products Co.—in January of this year.

THE PRESIDENTS



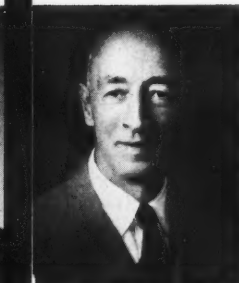
L. S. Hitchner
1934-40



Warren Moyer
1940-42



Joseph B. Cary
1942-46



G. F. Leonard
1946-49



Ernest Hart
1949-51

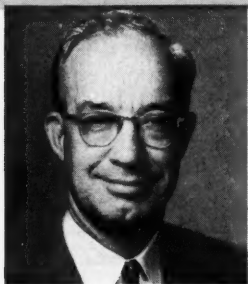


Arthur Mohr
1951-53

Paul Mayfield
1953-54



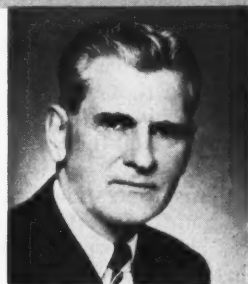
W. W. Allen
1954-56



F. W. Hatch
1956-57

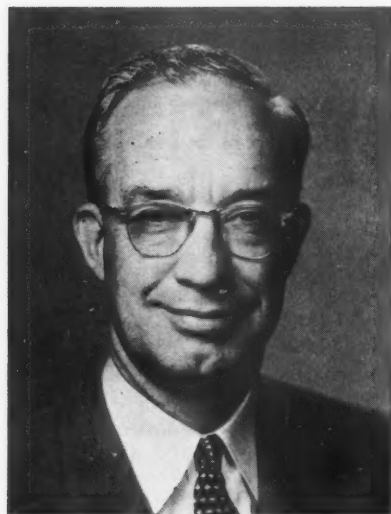


J. V. Vernon
1957-



NAC GROWTH:

Best Chapter in an Eons Old Story



By **W. W. ALLEN**
*Manager, Agricultural Chemical Sales
The Dow Chemical Company*

GROWTH of the National Agricultural Chemicals Association is an interesting story in itself, but to me is most meaningful as one of the chapters in the growth of the agricultural pesticide industry.

Ours is an ancient industry, but at the same time is an infant industry. Centuries ago, natives of South America and Africa mixed quartz and silica dust into grain stored in earthen pots to control insects in the grain. Control of sorts was achieved by the abrasive and dessicating action of the crystals on the insects. Efforts are still being made to perfect this control method for modern use. (*Ed. note: see page 53.*)

Perhaps the start of the farm chemicals industry can better be anchored in the first use of Paris green by midwestern potato growers a century ago, closely followed by the development of Bordeaux mixture in France.

At The Dow Chemical Company we date our agricultural product history back 51 years. Our first product was liquid lime sulfur for control of orchard pests. Many of the other major producers entered the field at this same time, but we had little need for an industrial association in those days. There were few products and applications in agriculture were limited.

A major turning point in Dow's agricultural product history came in the mid '30's. Until that time, operations had been largely a proposition of manufacturing known materials. Then it became apparent that a broad program of research and development activities was needed to meet the problems of agriculture. Once again, this point in our history can be applied as a generality to the industry. Since that time growth has been rapid. Exciting new concepts have resulted in many new products available to farmers. And the use of chemicals in agriculture has spread from a few isolated instances to become a major consideration.

From this point on, the growth of the industry is well characterized by the growth of the association that speaks for it.

NAC has expanded in size and gained in stature rapidly and steadily during its 25 years. From a small group of major producers mainly interested in arsenicals and insecticides, it has grown to represent every phase of this complex industry.

In those pioneering days we had no legislative problems, no headaches in recruiting good agricultural scientists and little, if any, problem in safety or in understanding by the public. With the rapid introduction of new materials we gained these problems. And it has been in solving these problems that we have sought, and received, assistance from an industry-wide association.

With the expansion in the use of pesticides have come laws governing their use. NAC's model pesticide laws have done yeoman duty in assisting state legislatures in drafting wise laws allowing farmers to protect their crops with these products, at the same time protecting the interests of the public and being fair to the industry. The Miller Amendment to the Pure Food, Drug and Cosmetic Act threw major changes into the operating methods of producing companies. Perhaps more than any other single event, its passage dramatized the value of an industry-wide association in smoothing out the roughest spots and working out understanding between government regulatory agencies and the industry.

The association also has been an invaluable spokesman at times when critics would picture us as heartless tycoons producing questionable materials endangering the public health and welfare.

The pesticide industry continues to grow rapidly. From this anniversary date we can look forward to ever-increasing growth for an industry and its spokesman. ▲

The plant shown on the preceding page is Dow's methionine production plant at Pittsburg, Calif.

When you add up the answers . . .

**GAUGE
VAPOR
PRESSURES?**

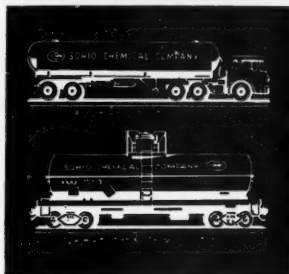
Fertilizer Raw Material Cost Calculation Sheet

FORMULATION COSTS?

Raw Material	Quantity	Unit Price	Total Cost
Ammonia			
Urea			
Phosphate			
Sulfur			
Other			
Total			

**SALTING
OUT
TEMPERATURES?**

**FIXED
TO
FREE
RATIOS?**



**CONDITION
OF FINISHED
GOODS?**

Grade Condition

Grade	Condition	Analysis	Cost
1	Granular	44% N, 15% P ₂ O ₅	\$1.25
2	Granular	44% N, 15% P ₂ O ₅	\$1.25
3	Granular	44% N, 15% P ₂ O ₅	\$1.25
4	Granular	44% N, 15% P ₂ O ₅	\$1.25
5	Granular	44% N, 15% P ₂ O ₅	\$1.25
6	Granular	44% N, 15% P ₂ O ₅	\$1.25
7	Granular	44% N, 15% P ₂ O ₅	\$1.25
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97	Granular	44% N, 15% P ₂ O ₅	\$1.25
98	Granular	44% N, 15% P ₂ O ₅	\$1.25
99	Granular	44% N, 15% P ₂ O ₅	\$1.25
100	Granular	44% N, 15% P ₂ O ₅	\$1.25



**it's a
SOHIOGEN[®]
solution
...and a Sohio contract**

**A complete line of SohioGen Solutions
for fertilizer manufacture**

**Ammonium Nitrate —
Ammonia Solutions**

SohioGen 1
SohioGen 1X
SohioGen 2
SohioGen 2X
SohioGen 4
SohioGen 7

The standard solutions familiar to the fertilizer industry in regular and concentrated grades

**Urea —
Ammonia Solutions**

SohioGen 21
SohioGen 22

Urea and ammonia in 45% nitrogen solutions, winter and summer grades, and for liquid fertilizer manufacture — high urea content solutions

**Urea — Ammonium
Nitrate — Ammonia
Solutions**

SohioGen 10
SohioGen 11
SohioGen 13
SohioGen 15
SohioGen 16

41 to 44% nitrogen solutions containing 10 to 15% urea to help mixed goods conditioning

**Urea — Ammonium
Nitrate Solutions**

SohioGen 31
SohioGen 32

28 and 32% nitrogen solutions containing no free ammonia

**Anhydrous and
Aqua Ammonia**

WHEN you plan ahead for the coming year, consider grade . . . condition . . . and formulation costs of your finished goods. Important factors like these automatically bring SohioGen solutions into the picture.

Sohio offers a full selection of nitrogen materials — ammonia, ammonium nitrate and urea — blended to a wide range of chemical and physical properties. That's why SohioGen solutions meet even your most exacting requirements. One example, SohioGen Solution 16 for granular fertilizers. Its high fixed-to-free ratio and precise urea-nitrate balance make it ideal for formulating high-analysis granular grades at lower cost. You save by using more of the low cost nitrogen materials . . . less acid . . . and you have more room to use lower cost phosphates.

Solve next year's problems before they start — call the "Man from Sohio" for details on the complete line of SohioGen solutions.

...we're serious about SERVICE at Sohio

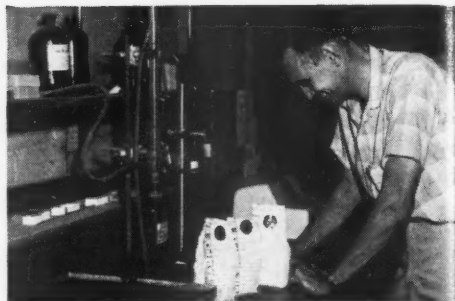


SOHIO CHEMICAL COMPANY

FT. AMANDA RD., P. O. BOX 628 • LIMA, OHIO

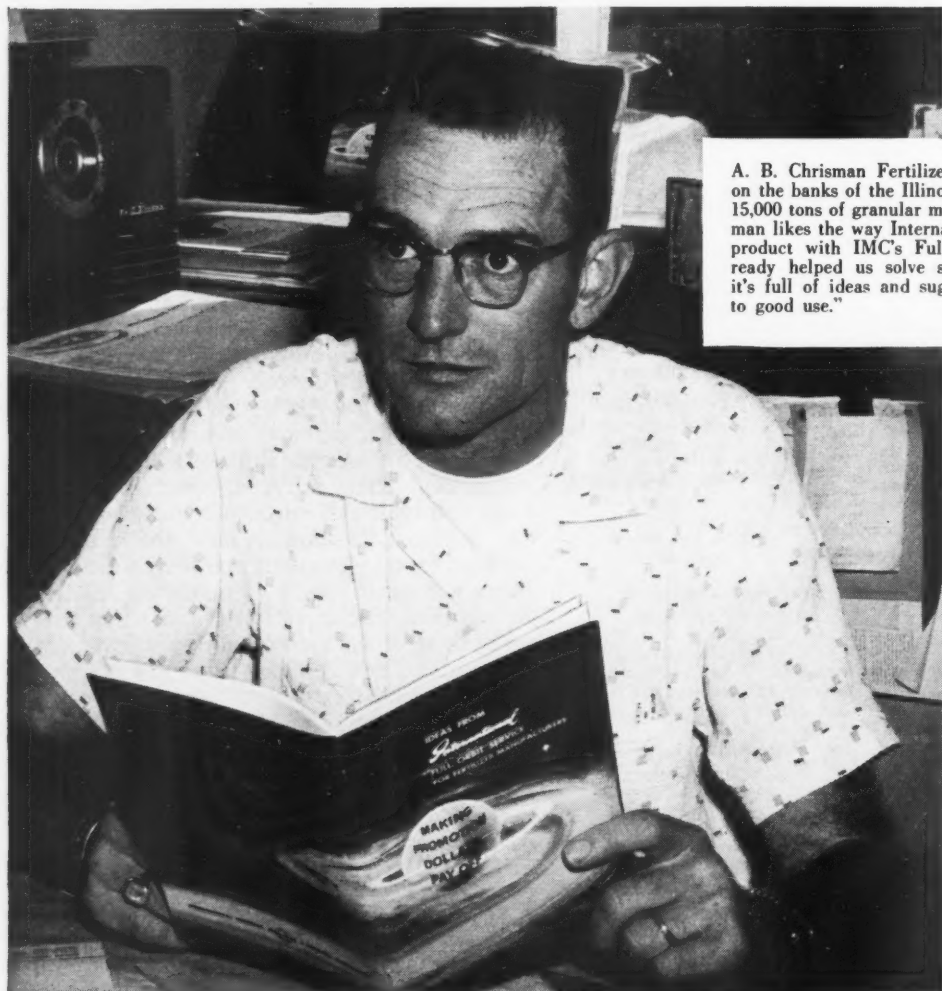
**STRAIGHT
FACTS
FROM
THE
FIELD . . .**

State-approved soil testing laboratory helps Chrisman improve service to his customers. Last year 10,000 sample tests were analyzed. Tester is Wilbur Kunzeman. Firm also employs a full-time agronomist.



"International's triple super service tailors delivery and service to my plant schedules," says A. B. Chrisman,

President, A. B. Chrisman Fertilizer Company, Meredosia, Illinois



A. B. Chrisman Fertilizer Company, located almost on the banks of the Illinois River, produces 12,000 to 15,000 tons of granular material annually. Mr. Chrisman likes the way International Minerals backs their product with IMC's Full Orbit Program. "It's already helped us solve some business problems — it's full of ideas and suggestions that we're putting to good use."





Joe Smith, Plant Superintendent, checks on carefully regulated flow of materials going into mixer, assuring a guaranteed dependable analysis of grade for the Meredosia area.



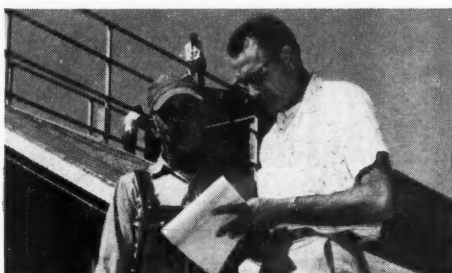
Out goes a sack of 0-46-0 on the back of Rol and Ransom. Most popular ABC brand fertilizers are 12-12-12 and 16-8-8. Chrisman uses IMC coarse run-of-pile . . . markets up to 12 different grades of fertilizer.

A. B. Chrisman has been buying IMC Triple Superphosphate for the past 21½ years. Asked why he uses International's Triple, he replied, "I started on International Triple Super because they were the first to ship by barge up the Illinois River to this area. I'd had promises of material being barged in by other firms but they didn't deliver. International promised *and delivered!*"

"The folks at IMC make it a business to know my problems, so they can give me the service I need when I need it. They work right along with me and help me anticipate my needs during the busy season when the rush is on.

"Shipment is always just what I order too," adds Chrisman. "I use International Minerals' coarse run-of-pile. It's top-notch quality material . . . has just the characteristics we need to help us manufacture our granular mixed goods."

You can benefit from International's triple super service. Write, wire or call for details.



Growing business necessitated expanded facilities. Chrisman and building contractor, Russell Collison, discuss new building that will add storage for 1500 tons of material.

Creators
of Living
Minerals

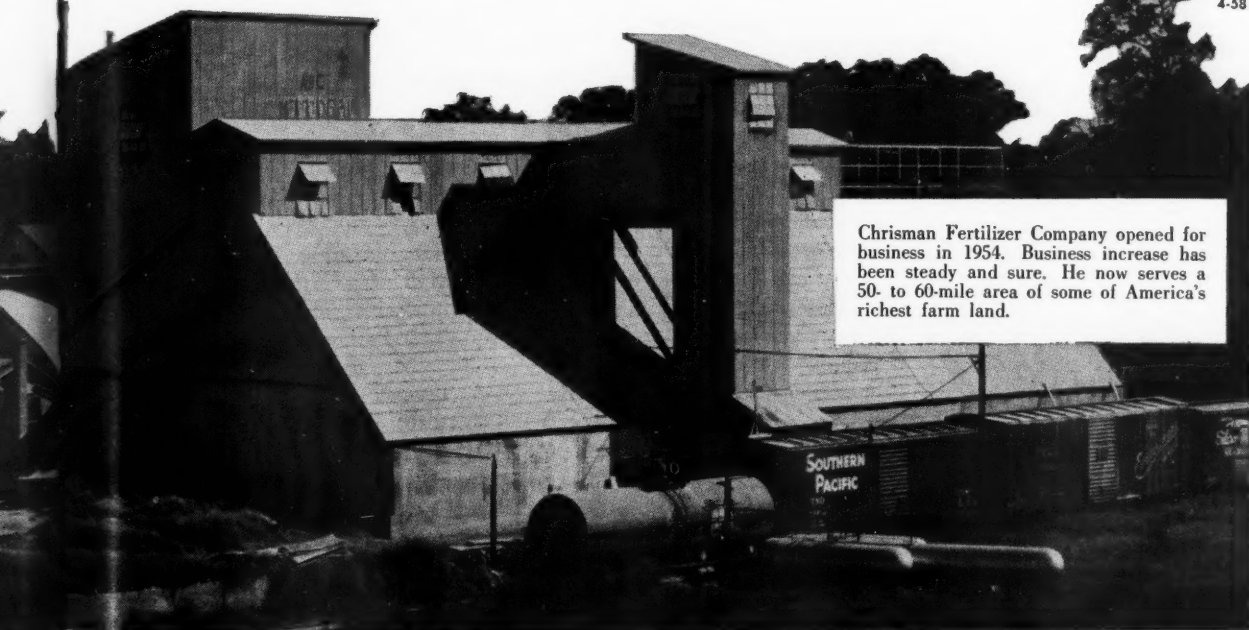


PHOSPHATE CHEMICALS DIVISION

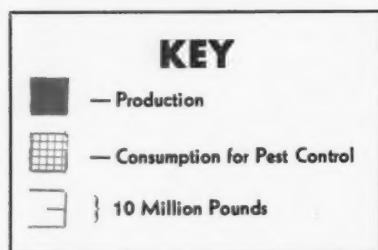
INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Administrative Center — Skokie, Illinois • Phone ORchard 6-3000

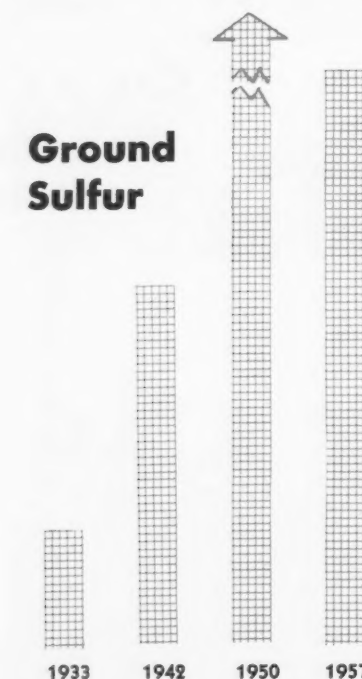
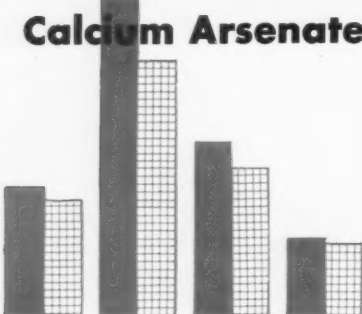
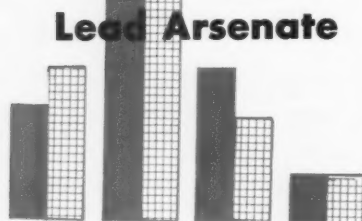
4-58



Chrisman Fertilizer Company opened for business in 1954. Business increase has been steady and sure. He now serves a 50- to 60-mile area of some of America's richest farm land.



1933 1942 1950 1957



FC asked USDA's Dr. Harold H. Shepard to illustrate U. S. production and consumption trends of selected pesticides and accessory materials for this NAC silver anniversary issue

PESTICIDE PRODUCTION

(x 1,000 lb.)

	1933	1942	1950	1957
Paris green	n. a.	(3,500)	neglig.	neglig.
Lead arsenate	29,816	63,577	39,434	12,152
Calcium arsenate	(34,000)	84,136	45,348	19,526
White arsenic and sodium arsenite (as As_2O_3)	—	—	—	—
Sodium fluoride	n. a.	n. a.	n. a.	n. a.
Sodium fluosilicate	n. a.	n. a.	n. a.	n. a.
Cryolite	—	—	—	—
Sodium chlorate	n. a.	n. a.	44,170	118,284
Borax	—	—	—	—
Sulfur, ground	n. a.	n. a.	645,650	n. a.
Lime sulfur	—	—	—	—
Copper sulfate	49,025	210,400	174,600	141,360
Mercurials	n. a.	n. a.	n. a.	1,110
Zinc sulfate	11,396	29,000	47,174	67,240
Tartar emetic	n. a.	n. a.	n. a.	n. a.
Nicotine (100% basis)	n. a.	1,530	500	n. a.
Pyrethrum (as flowers)	10,435 ⁶	9,452 ⁶	8,268 ⁶	6,966 ⁶
Rotenone (as roots)	576 ⁶	3,798 ⁶	10,013 ⁶	4,895 ⁶
Sabadilla	n. a.	n. a.	n. a.	n. a.
Kerosene	—	—	—	—
Mineral oil emulsions	n. a.	n. a.	n. a.	n. a.
Vegetable oils (incl. pine oil)	—	—	—	—
Liquid hydrocyanic acid	n. a.	10,000	n. a.	n. a.
Calcium cyanide	n. a.	n. a.	n. a.	n. a.
Liquid grain fumigants	—	—	—	—
Methyl bromide	neglig.	n. a.	2,212	9,653
Liquid soil fumigants	neglig.	n. a.	n. a.	n. a.
Naphthalene (refined)	42,708	81,584	84,304	71,913
Paradichlorobenzene	5,111	24,247	49,099	66,457
Organic thiocyanates	n. a.	n. a.	n. a.	n. a.
Dinitro compounds	n. a.	n. a.	n. a.	n. a.
DDT	0	0	78,150	124,545
Benzene hexachloride	0	0	76,698	39,559
Other polychlors	0	0	48,000	85,000
Parathion	0	0	n. a.	5,962
Organic fungicides	neglig.	n. a.	(20,000)	95,000
2,4-D (acid basis)	0	0	14,156	34,251
2,4,5-T (acid basis)	0	0	n. a.	5,334
Lime	—	—	—	—
Talc and pyrophyllite ⁷	309,000	775,000	1,124,000	1,384,000
Clays	4,270,000	15,000,000	80,000,000	91,420,000

n. a. Figure not available
neglig. Quantity not significant
— Figure without meaning here

(—) Figure based upon minimal evidence

¹1934 estimate by Roark

²Producers' sales or shipments

CONSUMPTION FOR PEST CONTROL

(x 1,000 lb.)

1933	1942	1950	1957	
4,000 ¹	3,300 ²	neglig.	neglig.	Paris green
40,000 ¹	67,000	27,490	12,000	Lead arsenate
30,000 ¹	67,250	38,842	18,250	Calcium arsenate
				White arsenic and sodium
8,600 ^{1,3}	15,000	4,000	n. a.	arsenite (as As ₂ O ₃)
4,000 ¹	1,200	500	n. a.	Sodium fluoride
neglig.	3,000	n. a.	neglig.	Sodium fluosilicate
neglig.	6,000	2,000	1,000	Cryolite
n. a.	10,000	33,500	(35,000)	Sodium chlorate
n. a.	n. a.	42,000	n. a.	Borax
30,000 ¹	94,000	395,000	150,000	Sulfur, ground
43,000 ¹	32,000	n. a.	11,000	Lime sulfur
12,000 ¹	94,000	100,000	31,328 ²	Copper sulfate
n. a.	117	342	482	Mercurials
n. a.	8,246 ²	11,682 ²	19,636 ²	Zinc sulfate
n. a.	110	neglig.	neglig.	Tartar emetic
800 ¹	1,042 ²	500	n. a.	Nicotine (100% basis)
10,000 ¹	8,000	8,000	7,000	Pyrethrum (as flowers)
1,500 ¹	3,500 ⁶	7,500	6,000	Rotenone (as roots)
n. a.	300 ⁶	n. a.	n. a.	Sabadilla
70,000 ¹	85,000	n. a.	n. a.	Kerosene
40,000 ¹	100,000	85,000	n. a.	Mineral oil emulsions
				Vegetable oils (incl. pine oil)
n. a.	10,000 ⁶	n. a.	n. a.	Liquid hydrocyanic acid
2,000 ¹	3,000	n. a.	n. a.	Calcium cyanide
n. a.	1,500	n. a.	n. a.	Liquid grain fumigants
n. a.	17,750 ⁶	30,000	48,000	Methyl bromide
0	530 ⁶	2,000	6,000	Liquid soil fumigants
neglig.	3,900 ⁶	12,000	n. a.	Naphthalene (refined)
16,500 ¹	22,339 ²	20,000	15,000	Paradichlorobenzene
5,000 ¹	15,000	6,000	5,000	Organic thiocyanates
n. a.	6,000 ⁶	n. a.	n. a.	Dinitro compounds
neglig.	4,000 ⁶	2,000	n. a.	DDT
0	0	57,638	71,000	Benzene hexachloride
0	0	(55,000)	(44,000)	Other polychlors
0	0	42,600	(58,000)	Parathion
0	0	2,551	(5,000)	Organic fungicides
neglig.	n. a.	16,000	100,000	2,4-D (acid basis)
0	0	17,600	24,500	2,4,5-T (acid basis)
0	0	1,261	2,200	Lime
n. a.	435,000 ⁶	n. a.	n. a.	Talc and pyrophyllite ⁷
n. a.	38,000 ⁶	154,000	174,700	Clays
n. a.	n. a.	230,000	253,990	

¹For grasshopper bait only

²Metallic basis

³Imports

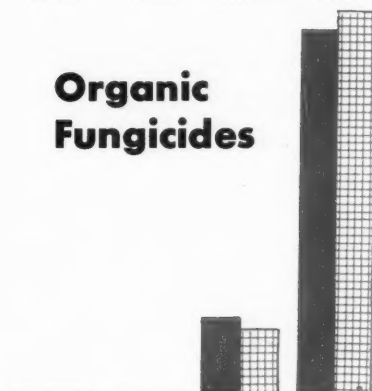
⁴1944 estimate by War Food Administration

⁷Pulverized

NOVEMBER, 1958

1933 1942 1950 1957

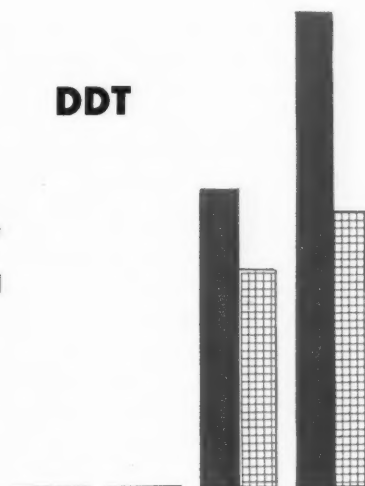
Organic Fungicides



Paradichlorobenzene



DDT



Benzene Hexachloride



1933 1942 1950 1957

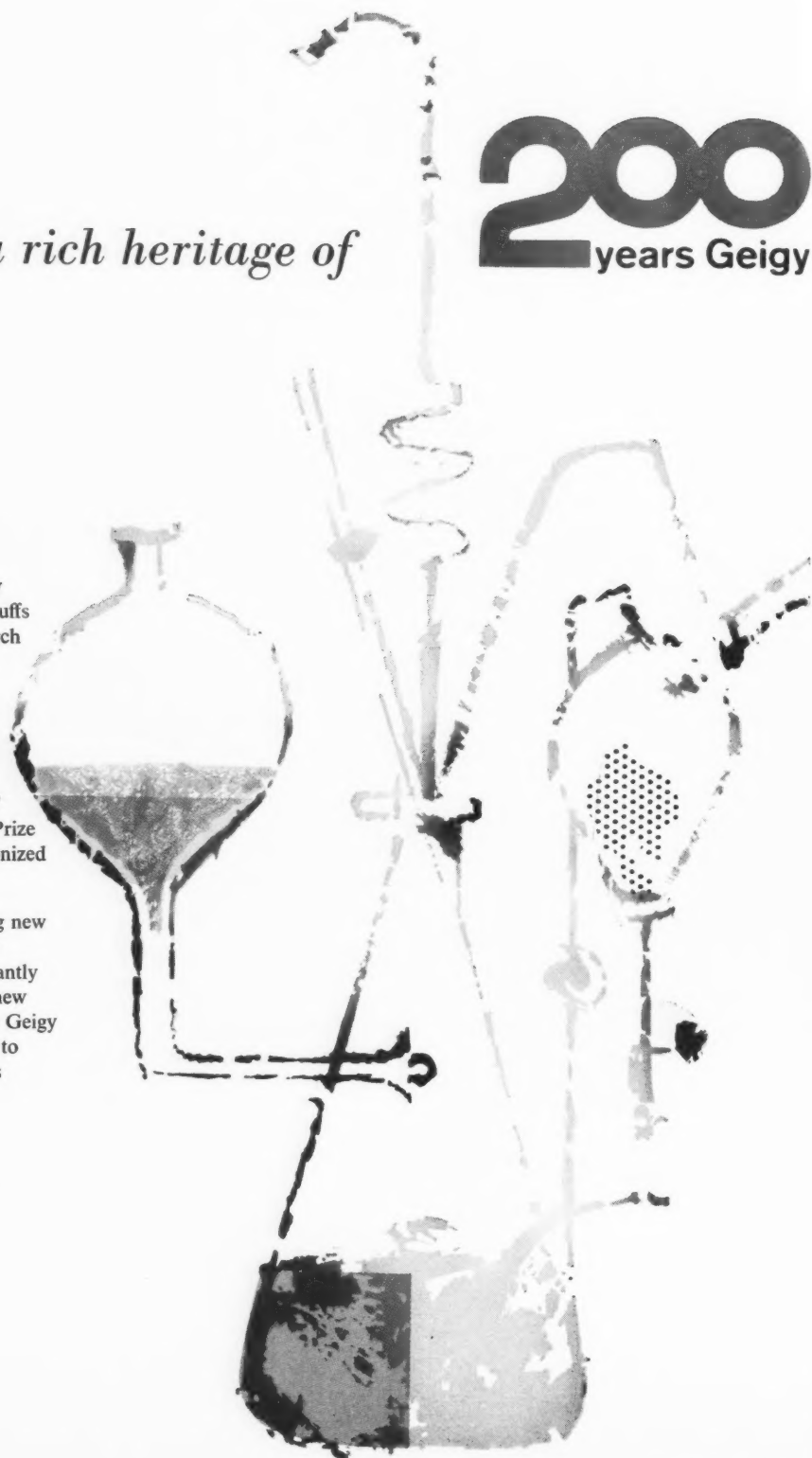
out of a rich heritage of

200
years Geigy

For 200 years, the name of Geigy has stood for quality in the dyestuffs trade. More recently, Geigy research has also brought renown in the field of pesticides.

Research in the field of moth damage prevention resulted in "Mitin" durable mothproofing. Then came the discovery of DDT insecticides, which won a Nobel Prize for Dr. Paul Müller and revolutionized the pest control industry.

Geigy scientists will go on blazing new trails. Research and development programs, and facilities are constantly being expanded—new ideas and new concepts continually tested. From Geigy Research, the future will continue to bring still more effective pesticides—for the benefit of all.



come more effective pesticides from Geigy Research

DIAZINON FORMULATIONS

Versatile effective organic phosphate insecticide for long residual fly control, multiple insect control on many fruit and vegetable crops. Extensively used by PCO industry for control of resistant roaches and other insects. May be formulated for household roach sprays.

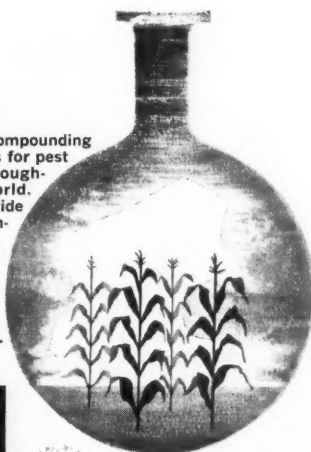


METHOXYCHLOR FORMULATIONS

Multi-purpose insecticide. Long residual action against many insect species attacking fruit, vegetable, forage crops, and stored grain. Controls horn flies, cattle lice and ticks on livestock.

GEIGY DDT

Used for compounding insecticides for pest control throughout the world. Controls a wide range of insects on ornamentals, vegetables, fruit, livestock, cotton and in forest areas.



SIMAZINE® 50 W HERBICIDE

New herbicide for use on corn. Applied pre-emergence, one application gives season-long effective weed control. Also for pre-emergence use on nursery stock, and at higher levels of application, as an industrial herbicide. Extremely low toxicity to humans and animals.

CHLOROBENZILATE FORMULATIONS

Safe, effective miticide for use on deciduous and citrus fruit, ornamentals and nursery stock. Long residual action.

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NOVEMBER, 1958

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"Some legislative activity is anticipated as state legislative bodies make ready for their 1959 sessions. For most part, these will be marginal proposals which could act as a retardant to research, development and marketing of agricultural chemicals." -- Lea S. Hitchner, NAC executive secretary

RESTRICTIONS AHEAD?

By JOHN HARMS

ONE OF THE MOST CRUCIAL adjustment periods in its history may be just ahead for the farm chemicals industry. Unless all signs fail, the next few years will bring on new proposals for government regulations—to allay fears of alleged dangerous side effects of the agricultural uses of chemicals.

Roots of what could be a drastic upheaval in present operational methods already are apparent in the few but significant investigations now underway. The Public Health Service study of the fire ant program's effect on aquatic life, and the Interior Department's expanded nationwide study of pesticides and wildlife may form a basis for attacks on the pesticide industry along a wide front.

The findings of these investigations, and the reports and recommendations made as a result, can be expected to stir up a public clamor for remedial action. Public pressure, expected to be fed by interests outside agriculture, will be exerted on Congress—and state governments. Washington observers think the buildup against pesticides could present the industry with an explosive situation. The ingredients of sensationalism are accumulating.

NAC and Farm Groups

The potential of current trends is not lost upon the most influential allies of the industry and the National Agricultural Chemicals Association on the national scene—the major farm organizations. Private talks with high farm organization officials point up an awareness and serious concern over the possible direction of new legislation.

Farm organization leaders in the past have co-

operated closely with the NAC in the development of "realistic" legislation governing the farm chemicals industry. One official points out that "NAC has apparently taken a constructive viewpoint on the question of regulation, and there has been no case where it has bucked the public welfare." He indicates that farm organizations would not hesitate to join the chemical industry in future legislative drives "if it continues to display the responsibility it has in the past."

Farm leaders feel they have a strong community of interest with the farm chemicals industry—and, according to their statements, see stronger ties in the years ahead. The farm groups are interested in seeing that the latest developments of chemical research are made available to farmers as quickly as possible. They, as the chemical industry, furthermore, feel a responsibility to protect the national well-being.

Chemicals and Farm Management

Confronted with the severe problem of rising farm production costs coupled with forecasts for long-term income declines, the farm leaders are opposed to any "unrealistic" or "punitive" measures which would prevent effective chemicals from reaching the farmer. This stems from the widespread realization that the use of farm chemicals is one of the most economic techniques of the new agricultural technology.

As one farm official put it to us: "Not only are farm chemicals advantageous from the technological standpoint, but from the economic effect." He explains that farmers now are getting 62% efficiency from their machinery compared with about 106% during the war. He adds that use of farm chemicals can be 100% efficient, and points out that

(Continued on page 57)



USDA Photo

FARM PRICE

SUPPORTS



USDA Photo

A penetrating analysis reveals the

BY
JOHN
HARMS

FOR YEARS THE DEPARTMENT OF AGRICULTURE has been busy attacking farm price supports. It refuses to recognize—or admit publicly—that there may be some “good” in such federal programs.

But now, for the first time, comes a competent study which says flatly that farm price supports have contributed substantially not only to farm welfare, but also to the good of the Nation. This may come as news to many of this country’s taxpayers and to industries selling the farm market.

The study was not prepared in the Department of Agriculture—which is perhaps best equipped to make such a study. It was made by Dr. Walter Wilcox, senior agricultural economist at the Library of Congress, who enjoys the confidence of the leadership of both political parties. Wilcox bases his study and conclusions on figures available at the Department of Agriculture.

Wilcox says: “Farm income is low today, using any modern yardstick one may choose . . . income would be even lower except for the price-supporting activities of the federal government.

“A rough and incomplete appraisal indicates government price-support and related programs, on a year-by-year basis, must have raised total net farm income substantially above what it otherwise would have been each year in the late 1930’s and early 1940’s, in 1948 and 1949, and from 1952 to date.”

Benefits of Price Supports

► Price supports have accounted for an average of 37% of realized net income per year since 1952. In 1956, supports plus related federal programs ac-

In the United States today there are about 1½ million marginal farmers.

Without the buoyancy given by subsidies and other measures, another 1½ million could sink into marginal operations.

major part government has had in creating the buying power of your market

counted for 31% of net income; in 1955, it was 44%; in 1954, 28%; in 1953, 50%; in 1952, 33%.

► Without price supports in those years, net farm income would have been 28% to 50% lower each year. In the absence of supports, net income would have been approximately this much lower: \$3.8 billion in 1956; \$5.1 billion in 1955; \$3.4 billion in 1954; \$6.9 billion in 1953; and \$4.7 billion in 1952. *This is spending money the farmer would not have had without supports in those years*, Wilcox stresses.

► The public has benefitted from price support expenditures through abundance brought about in part by increased stability and a higher level of farm income. On this Wilcox explains:

"Largely because farmers have been unable or unwilling to balance output with available markets, their income gains from price-support programs have resulted in gains for other sectors of the economy. These gains are of two types—additional workers released by investment in labor-saving machinery and increased output of food and fiber in subsequent years.

"It is highly probable that the aggregate influence of increased stability, and the higher level of farm income resulting from price-support programs has accelerated technical progress and increased efficiency in agriculture, more than off-setting the inefficiencies in resource use caused by specific commodity programs."

Reviewing past accomplishments of price supports, Wilcox says this "is in no sense intended to be a defense of the status quo . . . existing price-support activities have been in urgent need of modernization for the past 10 years."

These alternatives are open to agriculture in the years ahead, according to the Wilcox analysis:

1. Continue the present price support and distribution programs at present levels.

2. Develop effective production controls to hold production 4% to 6% below what it would otherwise be year after year for at least 5-10 years.

These two alternatives, together, could be expected merely to hold agricultural income at current levels—in an otherwise rapidly expanding national economy, he says.

3. "Allow production to move through commercial

YEAR	Realized net farm INCOME (billions of dollars)	Rough estimate: ROLE of Price supports (billions of dollars)	ROLE of price support activities as a PERCENT- AGE of net farm income
1937	5.2	1.1	20
1938	4.3	2.3	55
1939	4.4	1.4	32
1940	4.3	1.8	43
1941	6.2	.8	14
1948	15.9	5.5	34
1949	13.7	3.3	24
1952	14.3	4.7	33
1953	13.9	6.9	50
1954	12.2	3.4	28
1955	11.6	5.1	44
1956	12.1	3.8	31

Dr. Walter Wilcox's formula includes adding \$2.50 to net farm income for each dollar's worth of farm output taken off the market by government. This basis might be questioned, but there remains a wide gap between supported farm income and theoretical free market income.

Even USDA economists say so—privately.

markets and accept a drop of \$2 to \$5 billion, or 25% to 40%, in net farm income as compared with 1956-57."

4. Allow production to move through markets without support, with the government paying farmers the difference between that and "some desirable level."

The third alternative is Secretary Benson's approach, and the fourth alternative is deemed by Wilcox to be "improbable."

In summary, Wilcox declares: ". . . In view of these past accomplishments, it is surprising that agriculture's spokesman in the Cabinet, his research staff, and agriculture economists generally have been silent with respect to these facts, while publicizing the government costs of farm price support programs. Intelligent plans cannot be made for the future by those who only see the past through jaundiced eyes." ▲

FIRE ANT PROGRAM UP FOR REVIEW

Dr. Clarence Cottam, director of the Rob and Bessie Welder Wildlife Foundation in Sinton, Texas, took the floor at the September meeting of the International Association of Game, Fish and Conservation Commissioners in Philadelphia to make an impassioned attack on the federal-state fire ant eradication program.

The program, he charged, "is irresponsible, immature, ill-conceived and poorly directed." He claimed that "the only creature able to survive" the long-term residual effects of the spraying and dusting "is the subterranean fire ant." He concluded by saying that the agencies conducting the program will some day regret it. As he sat down, the assembled wildlife and conservation men joined in enthusiastic applause.



Evidence that other groups also are not completely satisfied with the fire ant program, is this report from Alabama:

A RESEARCH PROGRAM leading to improved controls of the imported fire ant will be conducted and coordinated by a new southern regional technical committee. The group was organized September 24, following a two-day, belt-wide conference of scientists and administrators at the Alabama Polytechnic Institute Agricultural Experiment Station.

The program is to be an expansion of research now going on plus new investigations directed at providing highly effective, low-cost control measures that would safeguard public health and conserve wildlife.

The broad objectives of the proposed southern region project include: (1) how control costs might be reduced; (2) chemical, mechanical and biological controls; (3) screening and developing additional insecticides for fire ant control; (4) effects of insecticides on population balances of insects, fish and wildlife; (5) food habits; (6) baits and chemicals attractive to fire ants; (7) immediate and long-range effects of control measures on wild-life; (8) lasting properties of insecticides in soil and water and their effects on man.

Dr. E. V. Smith, dean and director, API Agricultural Experiment Station, said in opening the conference that it was a highly significant step by all agencies concerned with the imported fire ant problem to get a common understanding of research completed and in progress, and to plan and activate a

comprehensive region-wide program of research to fill in gaps in our present knowledge.

Technical committee officers are: Chairman, Dr. F. S. Arant, API Agricultural Experiment Station; administrative advisor, Dr. E. V. Smith, dean and director, API Agricultural Experiment Station; and secretary, L. L. Glasgow, Louisiana State University.

Other designated members of the committee are: Ralph Allen, Alabama State Department of Conservation, Montgomery; Dr. Charles Lincoln, Arkansas Agricultural Experiment Station; Dr. A. N. Tissot, Florida Agricultural Experiment Station; Dr. C. M. Beckham, Georgia Agricultural Experiment Station, Griffin; Dr. L. D. Newsom, Louisiana Agricultural Experiment Station; H. B. Green, Mississippi Agricultural Experiment Station; Dr. J. H. Cochran, South Carolina Agricultural Experiment Station; Dr. J. C. Gaines, Texas Agricultural Experiment Station; Daniel W. Lay, Texas Game and Fish Commission; L. J. Padget, USDA Plant Pest Control Division, Gulfport, Miss.; Dr. Carroll Smith, USDA Agricultural Research Service, Orlando, Fla.; C. Edward Carlson, U. S. Fish and Wildlife Service, Washington; H. P. Nicholson, U. S. Public Health Service, Atlanta; Dr. L. G. Webb, South Carolina Wildlife Resources Commission; and Dr. W. J. Hayes, U. S. Public Health Service, Savannah, Ga.

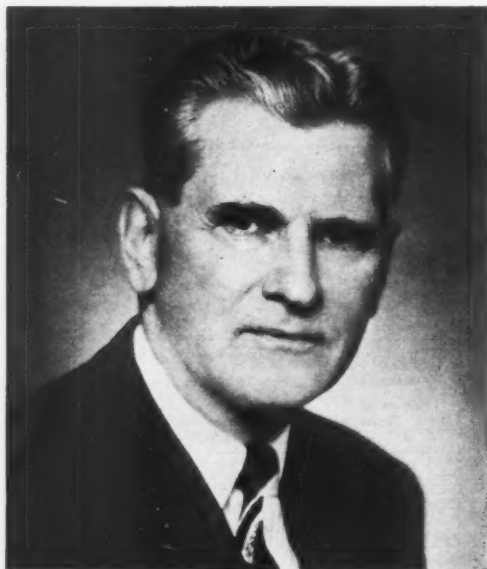
Agencies represented at the conference were the U. S. Public Health Service, U. S. Fish and Wildlife Service, USDA Agricultural Research Service, Georgia and Alabama public health departments, Florida State Plant Board, South Carolina Wildlife Resources Commission, Illinois Natural History Survey, Alabama State Department of Conservation, and the agricultural experiment stations of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, South Carolina, and Texas.

A FEW WORDS . . .

*From the
NAC President,
J. V. Vernon*

IN THE YEAR 1958, severe insect infestation outbreaks of great economic importance have, with a few exceptions, been negligible. To achieve this record of minimum crop damage, the cooperative efforts of many people and organizations have been necessary. I should like to compliment federal and state authorities and county agricultural agents on their alertness and diligence. At the same time, the manufacturing industry and the applicators have displayed a responsiveness without which these results would have been impossible. It appears that with industry ready and able to make available the proper toxicants at the right time, with federal and state agents helping to determine where and when

J. V. VERNON, vice-president,
Food Machinery and Chemical Corporation



action is necessary and with the applicators carrying out the job in a thorough manner, it is now practically impossible for serious infestations to get out of hand as they have in the past. The further continuation and expansion of this type of cooperation can only result in more effectively safeguarding the future of our agriculture.

In spite of the fine record to date it should be recognized that there is yet much to be done. The extent of damage still caused by plant pests is great—running into millions of dollars annually. In order to present all the facts relating to economic advantages of proper use of pesticides and to allay fears that may arise, a good sound educational program is needed. Such a program must be a combined effort by industrial, federal, state and agricultural organizations. NAC is planning such a program for 1959. I would like to recommend to representatives of other groups mentioned above that they also make a concerted and strenuous effort to establish and carry out such an educational publicity program for the coming year.

Better This Year Than Last, But . . .

I believe I can safely state that our industry has fared a little better in 1958 than last year. However, there are specific situations where certain of our products for use in localized areas have not come up to last year or the expected volume of the manufacturer. In our kind of business this is not an unusual situation. Much has been said about the generally improved financial conditions in American agriculture. This is true for certain segments, but in other areas it is not true. One would probably say that if agriculture as a whole shows financial improvement, then it should follow that the pesticide industry's financial condition should also improve. Again this is not necessarily true since it all depends on whether or not the products of our industry are needed in the areas where these improvements are shown.

Our industry is spending many millions of dollars in research for the future use of agriculture, improving plants, building new ones, gambling that infestations will occur and weather conditions will be favorable for good crop growth in the succeeding year. Yet with all these uncertain and unknown elements entering the picture, the return on investment is much, much too low and below the average for many other kinds of industries. In short, the risks involved call for greater return if the industry is to successfully combat the inherent crises.

Examine Cost Reduction Programs

In order to continue to serve adequately our important customer, agriculture, it is quite necessary that cost reduction programs be continually examined. More efficient methods of production must be adopted, more effective products must be developed in order that an improvement in the return on invested capital can be made. Considering all the hazards and uncertainties of doing business in this industry, I feel I would be remiss in not calling attention to this important phase of our business. ▲

I REMEMBER . . .

Lea S. Hitchner, NAC executive secretary, tells why Association strength has depended in large measure on members' spirit and officers' ability



THE National Agricultural Chemicals Association today, like the pesticide industry of which it is a part, reflects the progress possible through a free competitive enterprise system and a voluntary industry organization. Association progress depends upon cooperative efforts on matters of common interest, recognizing those functions which must be maintained under individual competitive company policy.

The development of what we now call the pesticide industry began in about 1900 when the few products available were mostly the by-products of other industries, and their effectiveness had been determined generally by accident or by meager technical research. For example, from the paint industry we obtained Paris green, London purple, and lead; from the smelting and refining industries, arsenic, copper and zinc. Importers supplied pyrethrum. Between 1900 and 1910, as interest in the use of chemicals in agriculture increased and sales potentials were appreciated, the nucleus of the pesticide industry began to take definite form. The need for cooperative action was also stimulated in the early 1900's by the passage of the California Insecticide Act in 1901 and the passage of the Federal Insecticide and Fungicide Act by Congress in 1910.

During this early period some problems facing the industry were packaging and labeling of poisonous materials, confused transportation regulations and the problems involved with the expected passage of federal legislation.

From 1910 to 1914 there was no formal organization, but manufacturers in the New York area met to discuss common problems.

A group of manufacturers of insecticides, germicides and disinfectants in 1914 joined to form the Insecticide Manufacturers Association, principally to clarify operations under the legislation passed in 1910. This organization had no paid staff.

Because of conflicting interests in this group, however, those interested in the agricultural field formed the Agricultural Insecticide and Fungicide Manufacturers Association in 1924. Ernest T. Trigg,

of John Lucas and Company, was elected president; T. S. Grasselli of Grasselli Chemical Company treasurer; and Harry J. Schnell, of the *Oil, Paint and Drug Reporter* served gratis as secretary. That publication was made the official journal of the association and did much to promote interest. Objectives of this association covered simplification of containers, legislative problems, transportation statistics and publicity.

In 1932 the Agricultural Insecticide and Fungicide Manufacturers Association was absorbed by the Manufacturing Chemists Association and an Insecticide and Fungicide Committee was formed within the MCA to serve the previous members of the Agricultural Insecticide and Fungicide Manufacturers Association.

As the agricultural insecticide industry continued to expand, Ernest Trigg, representing executives of several companies interested in the farm chemicals field, told me to spend three months at company expense to organize the Agricultural Insecticide and Fungicide Association. I was then employed by Mr. Trigg.

Personal introductions were made available by the company officials, and after several months of work, what is now the NAC had its beginning with a paid staff of three people in August of 1933. The headquarters were located in New York City. The name of AIFA was changed to National Agricultural Chemicals Association in 1949 and headquarters were moved to Washington, D. C.

The effectiveness of an association is dependent upon the ability of its officers and the enthusiasm of its members, and with this support NAC has continued to expand its activities during each succeeding year.

Organization of the new association was supported not only by those who formed the original group in the 1914 period, but by other industry leaders including the ten presidents who have served NAC.

Equally important has been the support given by

By DR. GEORGE C. DECKER—(see cover) who is shown at right examining cornfield in Vermillion County, Ill., made barren by the feeding of armyworms in June, 1953. He is principal scientist and head, section of economic entomology, Illinois State Natural History Survey.



*With achievement, challenge
and promise—*

"... A Pandora's Box of Problems"

FEW INDUSTRIES have experienced the enormous and exciting changes that have occurred within the agricultural chemicals industry in the past 25 years, and especially the latter half of this period. In the chemical pest control field the introduction of DDT and its availability for use in 1945 brought about an almost complete change in insect control practices and opened up a whole new realm of possibilities for the development of more effective insecticides, and the efficient and economical control of insects on many crops which—before that time—could not be protected from insect damage.

But while the dramatic changes in pest control which took place in the mid-40's opened the door to a challenging and promising future for the industry, they also opened a Pandora's box of problems. Few chemicals in use in other fields require the exhaustive testing that a pesticide must undergo to establish its effectiveness and safety before it is placed in general use. In addition to the time-consuming and expensive research carried on by individual companies

to develop new products and improve those already in use, many companies have sponsored research in state and federal agencies, the results of which are of benefit to everyone. Although such activities constitute an investment in the future of the industry, at the same time they are a considerable contribution to the welfare and economy of the nation as a whole.

The NAC has played no small part in the growth of the chemical pest control industry. It has been alert to the problems which have inevitably accompanied the tremendous growth of the industry and has worked diligently to help solve them. It has been equally cognizant of the responsibilities which the industry must assume and has worked with vigor not only to promote the welfare of the industry but also to stabilize it and help it maintain good perspective.

At the milestone of their 25th Anniversary celebration, we congratulate the officers and members of NAC on the way they have met the challenges of their growing industry, and wish them continued success. ▲

I REMEMBER . . .

(Continued from page 29)

committee members to the staff in carrying out operating programs.

Since the turn of the century there have been many factors that stimulated the necessity for cooperative action by the industry through the various associations.

During World War I, the association in cooperation with the Department of Agriculture and the Department of Commerce developed a voluntary program for supplying needed pesticides to American agriculture.

Following the war there was a voluntary program with the War Food Administration in which the association and the government, together with the land grant colleges, developed programs to help feed the world's population.

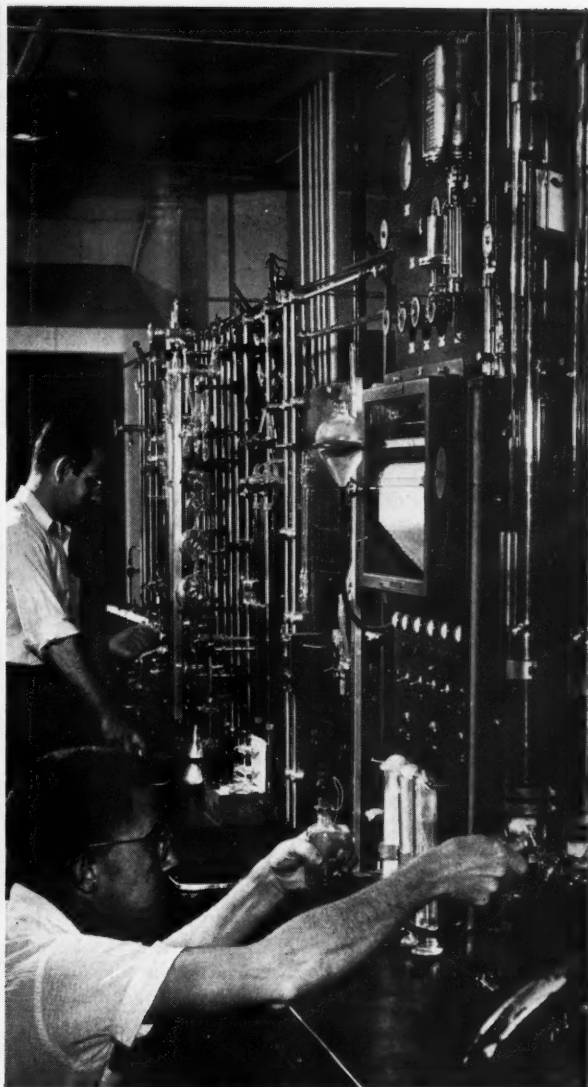
Through efforts of the association, industry personnel were supplied to agriculture, to various branches of the NRA and to the Department of Commerce during the days of the "New Deal" and

the Agricultural Adjustment Act. These personnel closely coordinated all of the NRA programs, again assuring American agriculture of needed pesticide requirements.

World War II again made necessary volunteer committee programs with government and industry to obtain raw materials and to supply agriculture and public health with pesticide chemicals.

The development and expanded use since 1945 of a wide range of new pesticide chemicals again created the need for cooperative action on matters such as legislation, safe handling and use, review of transportation classifications and review of legislative processes. These problems have existed since 1900 in various forms, but with the development of our more complex legislative and industrial systems there is now more need than ever for an understanding on matters of common interest.

Since December, 1942 one of the principal activities of NAC has been the dissemination of educational material. NAC is now endeavoring to acquaint the public with the necessity for the use of pesticides and their importance to our economy and health. ▲



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TEXACO
PETROCHEMICALS

ERADICATE FIRE ANT FOR GOOD OF MAN AND BEAST

An Editorial

THE best time of year to attack the imported fire ant begins this month and continues through winter and spring to May. Soon the federal-state-local imported fire ant eradication program in nine states will be resumed.

But there are those who oppose the eradication program, charging that the dangers to wildlife, the balance of nature and human life from aerial and ground spraying of granular heptachlor, dieldrin, aldrin and chlordane are too great—they think it would be better to live with the fire ant and watch it spread.

And at least one spokesman (page 26) says the subterranean fire ant—the intended victim of the program—is the only creature that can survive the residual effects of the insecticide applications!

"The fire ant will not persist in areas that have been treated." That's a direct quote from D. R. Shepherd, who is in charge of the USDA's Cooperative Control Operations Section of the Plant Pest Control Division.

"In 1957 and 1958, 500,000 acres were sprayed for the fire ant. There is no evidence of infestation on the treated land," he told us, continuing that, "in Union County, Arkansas, 40,000 acres were treated with granular heptachlor at the rate of two pounds an acre. That was practically all air spraying, with some mop-up ground work. You can't always get complete coverage the first year, but since the initial application in May of 1957 no fire ants have been found in that county." (Shepherd is also liaison officer between USDA and the Interior Department.)

Four insect pests and at least one plant disease have been eradicated in the United States. The Citrus Black Fly, discovered in central Florida in 1934, was eradicated by 1938 with an oil-type spray. The Parlatoria date scale infestation of the Imperial Valley in California was also eradicated by chemical means, in the mid-'30's. An infestation of Hall scale in two California counties was discovered in the mid-'30's. Starting in 1942, host trees were burned and treated with hydrogen cyanide under tarpaulins. There has been no infestation discovered for about two years. Citrus Canker Disease was eradicated in the seven-state infested area in the early '40's, by burning the host trees.

The infestation of Mediterranean Fruit Fly in southeastern United States was treated with malathion that was mixed with a protein hydrolyzate attractant. The quarantine has been lifted and there are 30,000 traps set up. Since November 26, 1957, no "medfly" has been trapped. The last precautionary spraying was performed in February of this year.

There has not been a single complaint made to the USDA by owners of land treated in the fire ant program. But complimentary messages, requesting continuation of the program, have been sent by farmers, county agents and others. While

farmers are anxious to rid their land of fire ants, they also place a very high value on the fish and wildlife on their farms. It's been said that if wildlife losses had been high, the word would have spread and owner participation in the area would have ended.

All nine states participate financially with the federal government in the program. In some states there is an arrangement whereby the farmer pays a fee for each acre treated, in addition to his state government's contribution. In Alabama it is \$1.25; in Louisiana, \$.75.

A USDA official said recently that "... scientists are improving procedures and developing cheaper ways of fighting the fire ant. Other insecticides and formulations are being tested. Efforts are being made to develop baits and attractants. . . . The search continues for parasites, predators and diseases that might be helpful in the battle. . . ."

Mr. Shepherd says sorptive inert dusts (see page 53) will be tried experimentally at the methods development laboratory in Gulf Port, Mississippi.

Of the total land area in the nine states, less than 7 per cent is known to be infested. Of this 7 per cent, 50 per cent is tilled land on which the insecticide, worked into the soil, usually holds no hazard for wildlife. So if all of the known infested area were to be treated in a single year, the wildlife on less than 4 per cent of the states' land area would be threatened. USDA says that even if such a program were contemplated, funds would not permit it. It is now estimated that no more than 1 million acres will be treated in any one year, with a ceiling of 200,000 acres in any state.

Wildlife management specialists, county agents, farmers, entomologists and zoologists have pointed out that the fire ant is a big killer of wildlife. And as it multiplies and becomes entrenched in an area, it is unquestionably a worse menace—as a killer—to mammals and birds than either the recommended initial insecticide application or its residue.

Critics of the program should remember that the fire ant, unchecked, will become not only an abiding wildlife destroyer, but also an ever more formidable agricultural pest.

When all statements are considered and all evidence is weighed, it becomes apparent that the program is designed for the use of known materials and methods to achieve eradication of the imported fire ant with an absolute minimum of undesirable side effects. The U. S. Public Health Service has stated that the program will not endanger the public, *if proper rules are followed in applying the materials.* And on pages 36 and 37, leading wildlife men acknowledge that the greatest burden of responsibility is on those who carry out the carefully planned program—the applicators.

LEE WILCOX

FARM CHEMICALS

READER SERVICE

FREE INFORMATION to help you
solve fertilizer, pesticide problems

Chemicals

282—NITROFORM HANDBOOK FOR MANUFACTURERS

Nitroform Agricultural Chemicals has prepared a manufacturers' handbook titled "Your Blue Chip Fertilizer Program." Among its contents are a definition of Urea-Form, the importance of mole ratio in urea-forms, chemistry of urea-form polymers, activity index value, agronomic properties of urea-form, nitrification of various nitrogen compounds. There is a question-and-answer section on the use of Nitroform in fertilizer mixtures, information on the "Blue Chip" service program, selling the turfgrass market and labeling instructions. To obtain a copy, fertilizer manufacturers only may

CIRCLE 282 ON SERVICE CARD

283—SEQUESTRANTS

A four-page folder from Geigy Industrial Chemicals includes a price list for two groups of sequestrants. After you've read it, you can obtain samples and more information on the particular sequestrants which meet your needs by tearing out a return card attached to the folder. For your copy

CIRCLE 283 ON SERVICE CARD

284—SAMPLES, DATA ON ANTIFOAMS

A new brochure with information on Silicone Antifoams, along with trial

samples, are available from Hodag Chemical Corp. Information on the antifoams, including selection of the proper one, specific physical and chemical properties of each type, applications and prices is covered. Also included is a description of Hodag's field engineering service and a list of industries and processes in which the antifoams are used as a low-cost solution to foam problems. The brochure and samples are available by

CIRCLING 284 ON SERVICE CARD

285—GUIDE TO DIAMOND PESTICIDES

"Your Ready-Reference Guide to Dependable Diamond Weed and Brush Killers for Effective, Easy, Economical Weed and Brush Control" is the title of an illustrated, 12-page booklet just issued by Diamond Alkali Co. Briefly reviewed in this pocket-size catalog are the Crop Rider, Fence Rider and Line Rider groups of Diamond herbicide formulations. Copies are available by

CIRCLING 285 ON SERVICE CARD

286—METHOCEL HANDBOOK

A colorful handbook on Methocel giving technical information and use data has been published by The Dow Chemical Co. Methocel is Dow's trademark for a family of methylcellulose ethers. These synthetic water-soluble gums have found a broad use in a number of industries for thickeners, emulsifiers, emulsion stabilizers, suspending agents and binders, Dow reports. The 60-page handbook presents physical properties of Methocel, describes its chemical composition, preparation of solutions, effect of additives, gelation of solutions and its use in agriculture, chemical specialties and other areas. For your free copy,

CIRCLE 286 ON SERVICE CARD

287—IGEPEON BOOKLET

"Igepon Surfactants," a new 16-page booklet published by Antara Chemicals Sales Div. of General Aniline & Film, gives properties and uses of the company's Igepon series of anionic surfactants. The booklet states that Igepon AP-78, T-43 or T-77 promote fast wetting and stable dispersion in pesticide powders. Copies can be obtained by

CIRCLING 287 ON SERVICE CARD

Process Equipt.

288—"ELECTRI-CAND" PUMP BY A-C

Allis-Chalmers says the "Electri-Cand" single-stage, single-suction pump provides leakless handling of all liquids. Designed for handling costly or volatile substances at temperatures to 200° F, the pump is available in capacities to 500 gpm at heads to 250 ft. It is said to require neither mechanical seal or packing. Carbon sleeve bearings are used in the motor. More information is available. Just

CIRCLE 288 ON SERVICE CARD

289—CHEMICAL PROCESS EQUIPT. BULLETIN

New "Chemical Process Equipment" bulletin contains product description and specifications on the complete line of blenders, vacuum tumble dryers, packaged resin-distillation pilot plants and process heat exchangers made by The Paterson-Kelley Co., Inc. Organization and operation of the company's pre-test laboratory also is described. To get your free copy,

CIRCLE 289 ON SERVICE CARD

290—DUST COLLECTION

Details of the Joy Microdyne dust collector are included in a 12-page, two-color bulletin released by Joy Manufacturing Co. The Joy Microdyne is a wet inertial type dust collector installed as part of the duct, and is said to be only one-tenth the size of other collectors of comparable performance. More than a dozen photos showing the collector at various installations, complete specifications and cutaway drawings are included in the bulletin. For your copy,

CIRCLE 290 ON SERVICE CARD

291—MIXER-BLENDERS

Models of batch mixers that will mix materials of varying specific gravities and minute or trace quantities are described in a four-page specification sheet from Munson Mill Machinery Co. The machinery principle: fast, accurate blending without reduction of particle size of ingredients that are tumbled, turned, cut and folded, the company says. To secure your free specification sheet

CIRCLE 291 ON SERVICE CARD

How to use the READER SERVICE CARD

- Circle number of literature you want
- Print or type your name, position, company and address,
- Clip and mail the Service Card.

292—NEW HUDSON SIDE HANDLE

The Multiwall Dept. of Hudson Pulp and Paper Corp. announces the successful application of a double side handle to multiwall bags which easily supports weights of 50 lbs. and more. This innovation makes 50 lb. loaded multiwall bags as easy to carry as a suitcase, Hudson says, and obviously has great sales benefits because of the ultimate convenience for the end-user.

CIRCLING 292 ON SERVICE CARD

Materials Handling

293—LIFT TRUCK CIRCULAR

A new circular on the MN narrow-aisle rider-type electric tiering truck is available free from Lewis-Shepard Products, Inc. The 7-page circular contains complete operating and maintenance details on the 24-volt truck. Available in capacities of either 2,000 or 3,000 lbs., the Model MN maneuvers and stacks goods in aisles as little as 6-feet wide when carrying a 40-inch load. For your free copy of the circular,

CIRCLE 293 ON SERVICE CARD

294—BAG STACKER BULLETIN

One-man push-button loading of box cars and trucks is the subject of a Bulletin by Power-Curve Co. The portable, power-driven conveyor for bags and packages includes a stacker belt. With this conveyor, Power-Curve says one operator can load bags or packages weighing up to 100 lbs. each into a box car or truck at the rate of 30 a minute. For the free bulletin,

CIRCLE 294 ON SERVICE CARD

295—BULK SCALE WEIGHS, RECORDS

Richardson Scale Co.'s mechanical bulk weighing scale will weigh and record dry, granular, sluggish, powdered and dusty materials, the manufacturer reports. Designed for either finished products or ingredients in process, the scale has a totalizing counter for exact recording of all operations. Capacities are from 20 to 50 lb. with volumes up to 5 cu. ft. Materials handled range from light hulls to heavy ores, and consistencies vary from $\frac{1}{4}$ inch lumps down to 300 mesh particles. For more information,

CIRCLE 295 ON SERVICE CARD

Miscellaneous

296—FIBERCAST PIPE & TUBING

Fibercast Co. has released a comprehensive bulletin on chemical and line pipe, tubing and fittings. A complete engineering data and general information booklet, its 16 pages cover such subjects as: what it is; production quality control; pipe strengths; engineering data and charts; chemical resistance; specifications; installation procedures and applications in the chemical, petroleum and other industries. Copies are available by

CIRCLING 296 ON SERVICE CARD

297—ATOMIZING NOZZLES

A new bulletin just prepared by Schutte and Koerting Co. describes the company's line of atomizing nozzles for spraying liquids in quantities up to about 3 gpm. The nozzles produce fine, uniformly atomized hollow-cone sprays, reports S&C, and are available in several sizes. The bulletin includes information on sizes, dimensions, capacities and materials of construction. Copies may be obtained by

CIRCLING 297 ON SERVICE CARD

298—APPLICATION DATA

A new data sheet issued by the applications laboratories of Beckman/Scientific and Process Instruments Div. shows the chemist how to perform nonaqueous titrations with speed, simplicity and much less equipment than required with conventional methods. Use of the Beckman Zeromatic pH meter and a combination electrode for hundreds of high-endpoint sensitivity titrations in nonaqueous solutions is described. Included are extensive bibliography and cross reference index, covering titrations of organic and inorganic materials in petroleum and chemical products. To obtain the application data sheet, just

CIRCLE 298 ON SERVICE CARD

299—154 PAGE ROLLER CHAIN BOOK

Said to be the most comprehensive ever written on precision steel roller chains and sprockets, a book now available from Link-Belt Co. contains 154 pages of detailed engineering data illustrating roller chain's versatility in a wide range of applications. The book contains typical installation conditions, formulas, charts and diagrams to simplify selection of proper chains for any

application. "Keydexed" for easy reference, the big book describes the selection-application, installation, lubrication and maintenance of roller chains and sprockets for drives and conveyors. It also is a guide to application of corrosion-resistant stainless steel and bronze roller chains. A copy will be yours, free, if you

CIRCLE 299 ON SERVICE CARD

300—PVC PIPE MANUAL

A sixteen page manual giving detailed information for selection and application of its line of polyvinyl chloride pipe, tubing and fittings has been published by Carlon Products Corp. Illustrated with photographs, charts and tables, the two-color bulletin covers Carlon's Schedule 48, 80 and 120 PVC fittings. Data includes comparative costs of PVC and comparable metal piping; mechanical, thermal and electrical properties; pipe and tubing sizes and specifications; and fitting types, sizes and dimensions. Tables show corrosion resistance to several hundred common chemicals. For your free copy,

CIRCLE 300 ON SERVICE CARD

301—LEVEL CONTROL FOR BULK BINS

"Easy-off cover" and a "fail safe device" are two features of Bin-Vue level indicators and controls covered in a bulletin from Convaire. The manufacturer says anywhere bulk materials are stored or used in production, Bin-Vue indicators offer positive control and maximum operating efficiency. The bulletin includes a cut-away drawing, a wiring diagram, price information, and describes operation of the indicator. For a copy,

CIRCLE 301 ON SERVICE CARD

302—LOADING ASSEMBLY MODEL CATALOG

Detailed descriptions and photos of OPW-Jordan loading assemblies are included in a 24-page catalog available free of charge from the company. Jordan Industrial Sales Div. says the loading assemblies are flexible, no-leak, piping devices for loading and unloading hazardous liquid storage units, tank cars, etc. They are available in slide-sleeve and scissor-arm, counterbalanced and lock-spring balanced models, sizes 2" through 6". For your copy,

CIRCLE 302 ON SERVICE CARD

303—CONVEYOR ELEVATORS FOR CHEMICALS

A new brochure available from The Bucket Elevator Co. describes the company's conveyor elevators for food, pharmaceutical and chemical industries. Bucket conveyor elevators can be used to load mixers, blenders, packaging machines, bins, grinders and sifters, and to transport bulk material from floor to floor. One of their features, cantilever design, permits removal of casing covers, pulleys and belting without disturbing bearings, mechanical seals or other operating machinery, according to the manufacturer. The four page illustrated catalog will be sent to you if you

CIRCLE 303 ON SERVICE CARD

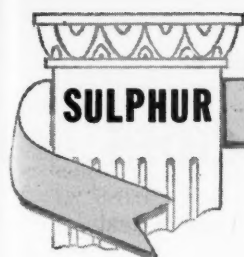
See pages 55 and 56 for information on
these Reader Service Numbers:

304—Dust Control

306—Tornado Mill

305—Tote Tank Plan

307—Sohio Folder



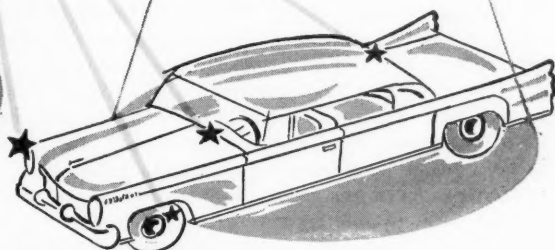
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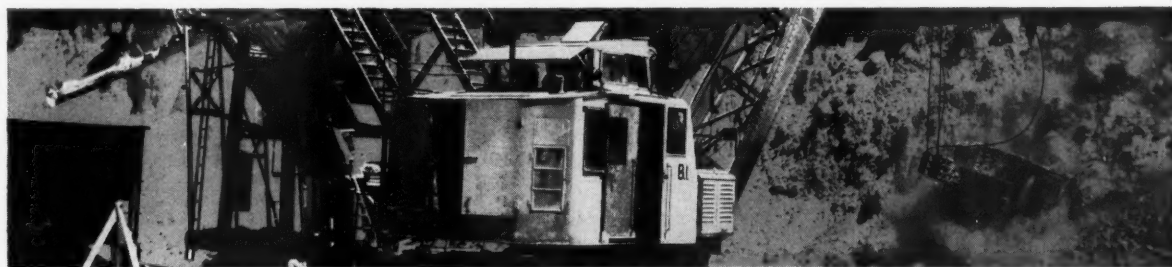


Sulphur enters the automobile picture in two ways:

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Consider now some key comments, findings and recommendations of

WILDLIFE AUTHORITIES ON PESTICIDES

- ▶ Connecticut application permit for air now, ground next
- ▶ The cumulative sublethal and the indirect effects
- ▶ Responsibility of the applicator
- ▶ More knowledge needed for new philosophy of control

Excerpts from a paper, "Pesticides: Where Do We Go From Here?" presented by Dr. John L. George, Biologist of the U. S. Fish and Wildlife Service, at the 48th annual convention of the International Association of Game, Fish and Conservation Commissioners in Philadelphia September 12. Italics are the editor's.

EACH DAY THERE IS A NET GAIN of about 105,000 people in the world. This continually expanding and ever more prospering population places increasing demands upon productive areas and management.

Insects and other pests threaten agricultural production and may carry diseases or be a nuisance. Economic pressures and intensive management therefore, have resulted in constantly increasing demands for effective pest control.

These demands have resulted in development of new chemical agents and improved methods for their distribution over increasingly wide areas. Over 200 basic chemical pesticides and more than 6,000 brand-named products are on the market today and the number is increasing constantly.

Each year wildlife habitats are exposed to greater quantities of more highly toxic materials. Wildlife damage is known to have resulted in some instances but side effects of many programs have received little or no study. In general, fish and other aquatic animals are most sensitive to pesticides. Fish have died after applications of $\frac{1}{4}$ pound per acre of DDT in oil; whereas other cold-blooded vertebrates can tolerate amounts of DDT up to 1 pound per acre. Birds can tolerate up to 2 pounds of DDT per acre and mammals up to 5 pounds. Most of the insecticides that are in common use are more toxic to vertebrate animals than is DDT. On the other hand, some herbicides and most fungicides are less toxic than is DDT.

Pesticides can affect animals more subtly than by killing them outright. Birds can store sub-lethal doses in their body fat, and this accumulation can cause poisoning later when fat reserves are utilized. Delayed effects can be produced also by consumption of very minute amounts of DDT (as little as 0.0003 ounce daily during a two-month period). There may be no outward effects on the adult birds, but production and fertility of eggs and survival of young will be reduced significantly.

The Application Permit System in Connecticut

States can take effective action to regulate activities within their boundaries. Recently Connecticut

passed an act which requires a permit for all aerial applications of pesticides. A wildlife representative is one of the members of a four-man board that regulates pesticide use in that state. Among their other activities, the board prescribes specific chemicals, dosages, and habitat treatments. The permit system also will give Connecticut a permanent record of the chemicals that have been applied by air, when and where they were applied and in what amounts. Connecticut is now drafting similar legislation to regulate ground applications of pesticides. When this legislation is passed, Connecticut will have a record of where and when specific chemicals have been used. At present it is difficult or impossible to learn the history of treatment on any given area. This is especially unfortunate because the chlorinated hydrocarbons remain toxic for years.

Time For a New Approach?

The time may have come for a change in the philosophy of pest control that has prevailed for the past decade. A new approach might include the following suggestions:

1. Chemicals can be developed that will be toxic specifically to one particular group of animals and still be non-toxic or only slightly toxic to others. Some chemical compounds are markedly selective even within a class of animals. For example, P.T.C., which was widely used in human taste tests, was found to be very toxic to rats. In one test dieldrin was 50 times more toxic to upland gamebirds than it was to waterfowl. Of course, what wildlife biologists want is chemicals that are specific to a given insect pest and not toxic to vertebrate animals.

2. Biological methods of control are promising for some pest insects. Control of insects by other insects and by disease is the most important factor in regulation of insect numbers, despite all the use of pesticides. Probably all insects could be controlled by biological means at least to a degree. Unfortunately, the margin of crop loss allowed to insects is very low and biological control may not always give this necessary degree of economic control. This is particularly true for the insect pests of the most intensively cultivated crops and for insects that carry diseases. Judicious chemical treatment combined with biological control probably could control many insect pests more inexpensively than could chemicals alone; but as stated by Hagen and Smith of California in a recent review

of this subject, "Many advocate the ecological approach to insect control; few practice it."

3. Cultural control of insect pests by changes in the environment holds great promise in agriculture and to some extent in forestry. Proper use is based on ecological knowledge and experiment. It includes: planting and harvesting at particular times; proper fertilization and rotation of crops; destruction of insect wintering quarters; and manipulation of water. In the opinion of research entomologists, not nearly enough effort is being put on research to find cultural methods of insect control.

4. Many research entomologists that work with economic pests believe the development of varieties of plants and animals that are resistant to insects and disease holds the greatest promise of all. It will take time and experimentation to exploit this promising field fully; but for this reason it is all the more imperative that concerted effort be made now.

From a paper, "Pesticides, Blessing or Curse?" presented by Dr. Ira N. Gabrielson, president of the Wildlife Management Institute, at the same meeting.

Dr. Ira N. Gabrielson, president of the Wildlife Management Institute, described the "phenomenal growth" in number, potency, and use of chemical pesticides since the end of World War II, and cited several examples of fish and wildlife kills caused by insecticide applications.

"Spectacular though these direct kills may be," he said, "what concerns the biologists most is not the direct but the cumulative and indirect effects of these spraying operations. Dieldrin, toxaphene, DDT, and the other chlorinated hydrocarbons are extremely stable, retaining their toxicity for long periods of time. In slightly acid water, for instance, toxaphene may maintain its potency to kill fish for years, as found by research workers in Texas. When an area is sprayed once at rates of application sublethal to fish and wildlife, a certain proportion of the chemical is washed into the soil and stored there. When the area is resprayed, the residue continues to build up after each application, and although any single spraying may not be directly toxic to higher forms, some crops are sprayed several times during each growing season. Lethal doses of chemicals

gradually build up in the soil, eventually to be washed by rains into water courses or to be picked up with grit and food by birds."

Dr. Gabrielson described potential "indirect biological costs to the public" that might be caused by pesticide applications, and stressed that because too little research has been conducted to date, there is not enough knowledge of effects upon: the ecology of treated areas, fatality and possible repopulation of valuable fish and wildlife, food supplies of insectivorous birds, development of resistant strains of insects, and human life.

"These are some of the problems," he said, and asked: "What can we do about them? The chemical companies are meeting a public demand, and some of the larger firms are making efforts to minimize threats to wildlife. The major problem lies with the user, whether commercial contractor, governmental agency, or individual farmer."

"Properly applied," Dr. Gabrielson said, "the new pesticides present a potent weapon against undesirable insect pests. I firmly believe that with adequate facts and the development of harmonious working relationships between responsible governmental agencies, the objectives of the present programs can be achieved with minimum losses to desirable wildlife. In many instances, losses already reported might have been eliminated or minimized by the substitution of selective mixtures, altering spraying patterns and similar practices. Where such steps are impractical, the only recourse of the wildlife administrator is through legislative channels. The laws of too few states provide protection for wildlife against the indiscriminate use of potent chemicals.

"In my judgment, the present uncontrolled distribution of exceedingly deadly poisons is a major threat to both aquatic and terrestrial wildlife, and perhaps to man himself. Certainly there should be more information on both the immediate and long-term effects of such toxicants, but there also should be much more rigid controls of their use than exist in most states.

"If it is the duty of the agricultural agencies to do all they can to control pests harmful to the farmer, it is equally the duty of every fish and game agency to protect the resources under its control for the benefit of the general public." ▲

DR. IRA N. GABRIELSON (left), president of the Wildlife Management Institute, talks over a problem in wildlife conservation with **DR. JOHN L. GEORGE,** biologist of the Interior Department's Fish and Wildlife Service.

Lee Wilcox



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CHEMICAL INDUSTRY RESUMED GROWTH UPTREND SAYS VALUE LINE SURVEY

"The chemical industry is on the road to recovery," states *The Value Line Investment Survey*.

It seems well established, the report says, that the industry reached the low point of its recession in March. Indications of recovery have become increasingly apparent since that time. Sales have shown a steady upward trend through the end of the second quarter of this year, with June sales running slightly ahead of those of June 1957. Profit margins in many cases have widened, according to the report.

The report pointed out that while demand for fertilizer materials is relatively unaffected by short swings in economic activity, poor weather in farming areas reduced most producers' earnings during early 1958. In late spring, however, many manufacturers recovered lost business. American Agricultural Chemical Co. reported record earnings for the fiscal year ended June 30, 1958, the survey said.

Stiff competition from Mexico and from recovered sulfur, as well as the recession, are said to be taking some of the profits from the sulfur business. The report cited earnings of Texas Gulf Sulphur Co., which have fallen about 50 per cent from the peak achieved in 1955.

"The factors that depressed the chemical companies' performances in 1958 will aid their comeback in 1959," the Survey said. New plant, a drag on earnings when operations were below capacity, will contribute to heightened efficiency next year. Start-up costs will be lower and heavy overhead will be spread

over larger unit sales volumes. Demand for such basic industrial chemicals as sulfuric acid and chlorine-alkali compounds, first to feel the effects of the business downturn, may be expected to pace the advance.

UNION NEGOTIATES TO BUY ALL STOCK OF UNIVERSAL

Union Bag-Camp Paper Corp. has announced it is negotiating a contract to acquire all of the issued and outstanding stock of Universal Paper Bag Co. of New Hope, Pa., a maker of multiwall paper bags.

SAUCERS AND SUCH

This is the season normally devoted to flying saucers and sea serpents. However, neither has been much in the news this year, being unable to compete with actualities. Sea monsters are as out of fashion as waspy waistlines and the only saucers discussed are economic saucers.

The other kind are classified willy-nilly as UFO (unidentified flying objects). They are very controversial. People who report seeing them are classed willy-nilly with Uncle Willie who lost his marbles many years ago. People who pooh-pooh UFO are similarly regarded by the proponents thereof. Attendant rhubarb is not at all friendly.

Economic saucers are the latest bafflebag of professional economists. To saucer (verb intransitive) is to round out a bottom—as we understand it. When a recession bottoms out and business indices start upward again,

AP&CC PREPARES SAFETY WALL CHART

A large safety wall chart providing instructions for the proper handling of chlorate and perchlorate chemicals has been prepared by American Potash & Chemical Corp. for use by companies working with these chemicals.

A digest of safety rules and conduct, the chart includes materials that may ignite if mixed with chlorates or perchlorates, what type of clothing to wear and how to care for it when working with the chemicals, how the chemicals should be handled, stored, shipped and unloaded. There also is a First Aid section of instructions in case of accident.

Copies of the safety chart may be obtained only by organizations working with these chemicals. Address the company at 3000 West Sixth St., Los Angeles 54, Calif. AP&CC asked applicants to identify themselves by affiliation and particular application concerned.

that is a saucer—unless it is something else. If it is not a saucer, then it is probably a flash in the pan (a saucepan perhaps), or a bum steer. The Greeks may not have a name for that but the economists will.

When the ruins of our present so-called "civilization" are unearthed, presumably by some radiation-proof and inflation-proof denizens of Outer Space, their archaeologists may be puzzled by a curious field of earthly activity called Economics. They will no doubt be intrigued by the hieroglyphs (charts) hanging on the walls of the cubicles or cells occupied by the earth-bound aborigines of that period. They will wonder at the miles of ticker tape containing mysterious symbols like GE and GM, which represent a primitive form of society known as Capitalism.

Reprinted from Arizona Progress, August, 1958, published by Valley National Bank.

PRENTISS DRUG NAMES CANADIAN REPRESENTATIVE

Charles Albert Smith, Ltd. has been appointed exclusive Canadian representative and distributor for Prentiss Drug & Chemical Co.

The Smith concern maintains sales offices and warehouse stocks of Prentiss materials in Toronto and Montreal and has a Western branch at New Westminster, B.C.

IMC PHOSPHATE DEPT. FORMS ADVISORY BOARD OF DEALERS

The Four Leaf Phosphate Dept. of International Minerals & Chemical Corp. has named six fertilizer dealers as an advisory board to help expand its services to farmers and dealers in farm chemicals.

At a two-day meeting in Skokie, Ill., the board joined International specialists in discussing advertising, sales promotion, market research and customer needs and motivations. The result was a program for dealers to include customer surveys, sales analyses, price and credit reports, advertising promotion plans and other merchandising ideas. It will be reviewed by the board in semi-annual meetings.



FERTILIZER dealers named to customer advisory board were welcomed at recent meeting. Group included (left-right) standing: S. T. Keel, sales manager, phosphate minerals; J. L. Mealy, sales manager, rock phosphate; F. A. Koechlein, general manager, phosphate minerals; A. E. Cascino, vice president, marketing; N. G. Schenel, manager, sales services; James Prather, dealer and board member, Tarkio, Mo.; William Parrish, dealer and board member, Auburn, Ill.; and H. R. Haiden, assistant sales manager, rock phosphate. **Seated:** Hugh Graham, dealer and board member, Trenton, Mo.; G. W. Moyers, IMC vice president, phosphate minerals; and three dealer-members of the group: Lewis Flohr, Urbana, Ind.; William Edwards, Pontiac, Ill.; and Rome Schwagel, Sharpsburg, Md.

U. S. STEEL MARKETS GRANULAR AMMON. SULFATE

Ammonium sulfate in granular form is being marketed by United States Steel Corp. in some areas of the midwest for the first time this fall, according to Charles W. Baldwin of Pittsburgh, director of the USS chemical sales division. Facilities for production of the new product have been installed at the coal chemical recovery plant of the firm's Gary Steel Works.

Baldwin pointed out that introduction of USS granular ammonium sulfate in the midwestern area is one phase of the corporation's observance this year of its 50th anniversary in the chemical industry.

The new product, which provides 21 per cent nitrogen and 24 per cent sulfur, fills the demand for a larger uniform particle size, Baldwin said. "As with the former material, the new product is free-flowing, non-corrosive to machinery and is handled or stored in bulk or bags," he reported.

SPENCER SALES DOWN FOR 1ST TIME IN TEN YEARS

Substantially reduced sales of nitrogen products in the fiscal year ended June 30 interrupted a ten-year growth pattern for Spencer Chemical Co., according to the company's annual report. Net sales for the year were \$45,148,936, compared with \$48,262,634

a year earlier. Net income amounted to \$4,038,056 compared with \$5,130,791 a year before.

Agricultural products accounted for 47 per cent of the year's sales, compared with 53 per cent a year earlier. Industrial chemical volume was 19 per cent of sales, the same as the previous year. Sales of plastics products represented 34 per cent of the total volume, against 28 per cent in the preceding year.

DIAMOND ALKALI PLANS OHIO RESEARCH CENTER

Diamond Alkali Co.'s plans to build a multi-million-dollar "campus-style" research center a few miles south of Painesville have been announced by Raymond F. Evans, chairman and president of the firm.

"The project," Evans said, "marks an integral part of a long-range research and development expansion program by Diamond to meet the company's anticipated future growth needs and to maintain its competitive position in the chemical industry."

Evans indicated that Diamond's plans "hinge directly on the premise that both the North-South Thoroughway (Ohio Route 1) and relocated State Route 44 will remain in substantially the same respective locations as presently chosen by the Ohio Dept. of Highways." These roads, when completed, would make the center easily accessible from Cleveland and Painesville.

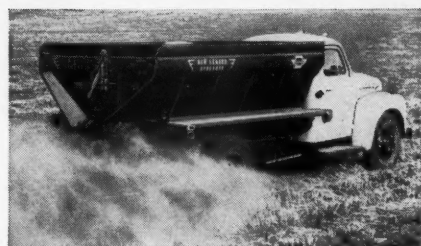
Present plans call for construction to be carried out in stages. Initial phase comprises a multi-unit group of buildings for Central Research and Development.

Engineering has begun on this phase, which the architects, Giffels and Rossetti, Detroit, estimate will cost from \$2 million to \$3 million.

AP&CC CHLORATE PLANT TO OPERATE THIS YEAR

The new sodium chlorate plant of American Potash & Chemical Corp. at Aberdeen, Miss., is expected to begin production late this year according to schedule, the company has announced.

Initial rated production capacity will be 15,000 tons per year.



NEW LEADER Model L-14S LIME SPREADER

is a high quality rig with a low price tag!

Cut your in-the-field costs with this simple to operate, easy to maintain spreader. Merely set the feedgate opening, start the truck, engage the PTO and start spreading! Material is delivered to the twin spinners over a wide 24" conveyor. Also available with a center dump for stock piling and windrowing.

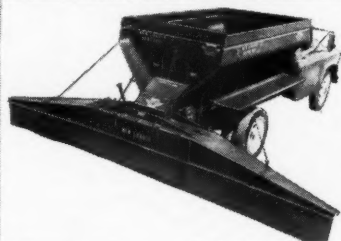
NEW LEADER *Engine-driven* Spreaders: Model L-52S with 24" conveyor is built for widespread use. Model L-62S with a 30" conveyor is for extra heavy, widespread lime applications. Both spreaders can also be used for fertilizer.

Accurately Blends and Spreads Three Fertilizers At The Same Time!

Now, offer mixed analyses at low, bulk rates!

Three separate feedgates, each with a test box for accurate metering, control the amount of spread. The driver can change the fertilizer ratio for varying soil conditions while in the field! Now, you can spread 3 kinds of fertilizer in one pass through the field... whereas, before it took 3 separate trips to do the job! A 7 h.p. gasoline engine drives the twin spinners at a constant rate, regardless of truck speed. The 36" belt-over-chain conveyor is powered from a drive-shaft drive synchronized to truck speed... for precise per-acre requirements. Optional equipment meters herbicides and insecticides into the fertilizer... spreads all three at once.

A *Powered Flow-Divider* assures even distribution of materials to both spinners, regardless of the position of the L-42S on hillsides or level ground. Customers appreciate this feature as it results in an even crop growth throughout the field.



Model L-19S Combination Spreader With PTO Drive, 24" Conveyor and Twin Spinners Delivers Fast, Uniform Spreads!

Simple operation saves time and upkeep. Just set the feedgate opening... start the truck engine... engage the PTO... start spreading! The body has 45° angle sides to prevent bridging—heavily reinforced to stop warp and twist—extended 6" higher to hold bigger payloads with less blowing.

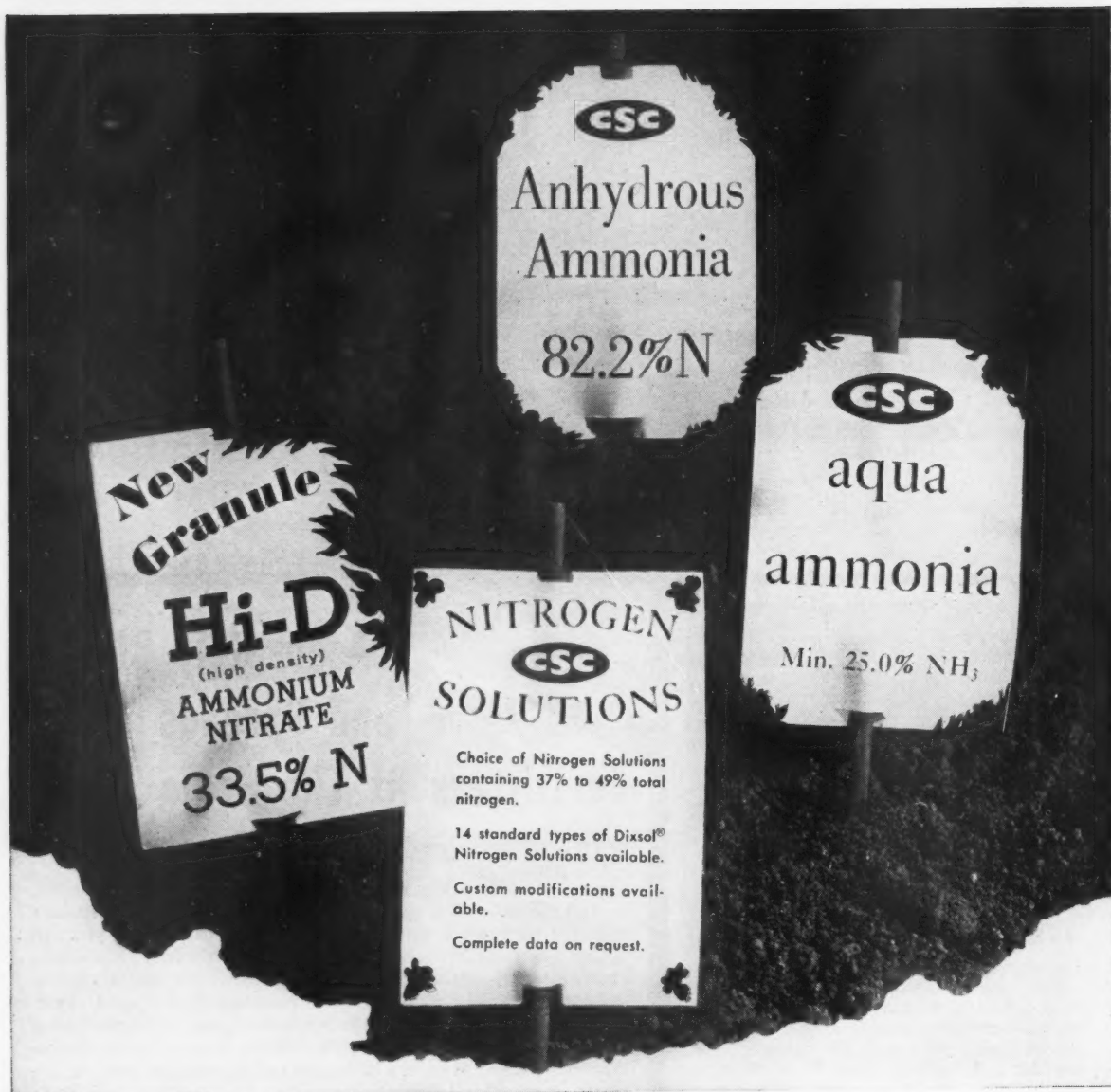
NEW LEADER *Engine-driven* Combination Spreaders are also available: Model L-22S with a 7.0 h.p. engine and Model L-32S with a 12.5 h.p. engine to deliver plenty of power for heavy applications of lime or fertilizer.

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Many leading fertilizer manufacturers, with a wide choice of quality supply, select CSC on the basis of thoroughly dependable supply and consistently prompt delivery. Pick up the phone, call one of the numbers listed—and see what service really means at CSC.

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FARM CHEMICALS

STAUFFER DOUBLES TRITHION CAPACITY

Stauffer Chemical Co. has doubled its capacity to produce Trithion, the novel insecticide-miticide developed several years ago in the firm's Research Laboratories. The first commercial plant to produce Trithion at Henderson, Nev., came on stream last April. The new increase in throughput capacity has been effected, according to the company, by the installation of additional reactors at Henderson and the development of process innovations for the manufacture of both the finished product and feedstock intermediates.

Trithion (chemically, O,O-diethyl S-p-chlorophenylthiomethyl phosphorodithioate) is a non-systemic residual compound which is effective against a wide range of insects. It is reported to have the longest residual activity of any common organic phosphate, but is less hazardous to apply than many other phosphate insecticides. Moreover, Trithion does not affect the taste or odor of any crop tested.

The company reports that demand for the unique insecticide-miticide during the entire past season has been greater than could be supplied by the Henderson plant. It anticipates that the new capacity may permit more liberal allocation of Trithion supplies during 1959.

SALES PERSONNEL SURVEY FINDINGS AVAILABLE

The aptitudes and traits of sales personnel in nine major sales fields have been investigated by the Bureau of Personnel Research, Inc. Over 13,000 people were surveyed. A simplified method of evaluating personalities has been made possible as a result of the study, according to the company.

Personnel measurement tool used was the Qualifications Record, a self-administering questionnaire. The BPR studies

showed that on the average, more than 90 per cent of the sales employees doing the same type of work gave identical responses to the Q/R. This enabled BPR to draw up composite studies, or job standards, for each category of salesmen.

These findings as well as the Q/R and supplementary material are included in a "Sales Personnel Packet", available to sales executives who write on their company letterhead to the Bureau of Personnel Research, Inc., P. O. Box 350, Beverly Hills, Calif.

COASTAL TO SELL STOCK TO BUILD FERT. PLANT

A registration statement has been filed by Coastal Chemical Corp. with the Securities & Exchange Commission covering the sale of 30,000 shares of Class C common stock and 111,763 shares of Class A common, *Oil Paint & Drug Reporter* has reported.

Proceeds will be used in constructing high-analysis fertilizer facilities, expected to cost about \$6.5 million.

DOW FORMS SUBSIDIARY FOR INTERNATIONAL OPERATIONS

Formation of an overseas company in Venezuela to handle its international operations has been announced by Dow Chemical Co. A wholly-owned subsidiary, Dow Chemical International Limited, S.A. will consolidate overseas sales of Dow products and administer the company's business interests.

Dr. Leland I. Doan, president of the parent company, was named chairman of the board and Clayton S. Shoemaker, president of the subsidiary. Offices have been opened in Caracas with Robert F. Kincaid, former manager of Dow's Montevideo, Uruguay office, as manager.

NEW PLANTERS F&P PLANT

A new granular fertilizer plant has been built in Charleston, S. C. by Planters Fertilizer & Phosphate Co. Its products will be distributed throughout South Carolina and parts of North Carolina, Virginia and Tennessee.



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SMITH-DOUGLASS MAY MERGE WITH WILSON & TOOMER

Possibility of a merger of Smith-Douglass Co., Inc. and Wilson & Toomer Co. was revealed in late September by Willard R. Ashburn, Smith-Douglass president.

At that time he said stockholders of the two firms, both of which have their major operations in the Southeast, have come to no decision in the matter.

Smith-Douglass, headquartered in Norfolk, operates 11 plants in ten cities, while Wilson & Toomer has six plants in Florida and Georgia. Founded in 1893, it is headquartered in Jacksonville. Smith-Douglass was founded in 1921 and has enjoyed its greatest growth since the end of World War II.

COPPER SULFATE, OXIDE PRICE SYSTEM ANNOUNCED

With its newly announced pricing system, Republic Chemical Corp. reports consumers and formulators now can know precisely the cost of copper sulfate and copper oxide during a full year.

Previously, prices fluctuated with the price of electrolytic copper quoted by refiners.

Hereafter, Republic will quote one price, firm for a 12-month period. The company adds that while there will be no fluctuations or advances, prices may be reduced if conditions warrant.

38 STUDENTS IN IMC'S SCHOLARSHIP PROGRAM

International Minerals & Chemical Corp. has announced that 38 young men and women are enrolled in U. S. colleges and universities this fall under the company's scholarship program.

Since inception of the program in 1947, International has awarded 98 scholarships to high school graduates, 26 of whom have completed four-year college

LARGE N SHIPMENT TO AYLCO



AYLCO officials Edwin Aylward, William Ingram, Charles Michael, Cecil Baylor, Dean Poole and Dwayne Haas witnessed dispatch of the shipment.

Largest single shipment of the year of nitrogen solutions for agriculture—requiring a 40-tank-car train and 11 tank trucks—was dispatched September 10 from the Lima, O. Sohio Chemical Co. plant to the plants of Aylco Liquid Fertilizer Co. and its dealers in Central Illinois, Aylco reports.

Edwin Aylward, Aylco president, and other company officials

were on hand to see the transportation fleet depart. In this shipment was more than 400,000 gallons of nitrogen solutions—enough to produce some 3,000,000 bushels of wheat, according to Aylward.

Aylco will use this shipment of nitrogen solutions for manufacture of mixed liquid fertilizers and for direct application.

courses with degrees. Four-year scholarships have gone to 70 students, while 28 received special, one-year awards.

NEW CONTRACT SIGNED AT SPENCER JAYHAWK WORKS

Spencer Chemical Co. has announced the signing of a new contract with the Business Representatives Council of Joplin and vicinity, bargaining agent for the 658 hourly employees at its Jayhawk Works, near Pittsburg, Kan.

The new contract—which grants an additional holiday, an increase of 7 cents per hour and other adjustments in working practices—covers June 1, 1958 through May 31, 1959.

WILSON LEAVES V-C; POTTER BECOMES PRES.

Virginia-Carolina Chemical Corp. president William H. Wilson's resignation was announced by Board Chairman Justin Potter

late in September. Potter has assumed the duties of the president.

Wilson, president for less than two years, reportedly left the firm because he disagreed with Potter on the extent of his authority.

HOOKER ESTABLISHES TRAFFIC DEPARTMENT

Hooker Chemical Corp. has formed a corporate traffic department to coordinate traffic activities of its plants at Niagara Falls, Montague, Mich., Columbus, Miss. and the four Phosphorus Div. plants at Adams, Mass., Columbia, Tenn., Dallas, Tex. and Jeffersonville, Ind. Later Hooker's other plants may be included.

Percy T. Brewbaker has been named general traffic manager, and Lorne Wilson, transportation consultant.

HOW TO GET THE MOST FOR YOUR FERTILIZER MACHINERY DOLLAR

Before You Buy, Check Sturtevant's Answers to These Key Questions

Q - How much experience is built into the design?

A - You get the benefit of 84 years of practical fertilizer industry experience in each Sturtevant machine you buy. Unrivalled for fertilizer plant engineering know-how, Sturtevant originated the 'Unit' idea. Whether your need is for a replacement pulverizer or mixer, or a completely modern granulating unit, Sturtevant-engineered machinery always can be depended upon to fit your requirements like a glove.

Q - Is the machinery engineered for peak-load efficiency?

A - All details in each Sturtevant machine have been proved by years of peak-load performance in fertilizer plants. Rugged construction that withstands the most slam-bang use, gears designed to always perform dependably, bearings that stand up under the heaviest loads, all can be taken for granted in Sturtevant ma-

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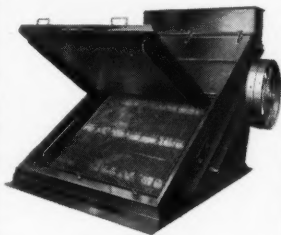
Q - How accessible is the machinery for clean-outs and repairs?

A - Clean-outs are a constantly recurring problem in the operation of a fertilizer plant. And minor repairs on hard-to-get-at machinery can consume hours of costly man and production time. Sturtevant's practical "Open-Door" design guarantees quick accessibility — for clean-outs and repairs. Any parts requiring cleaning or maintenance are quickly exposed by "One Man in One Minute".

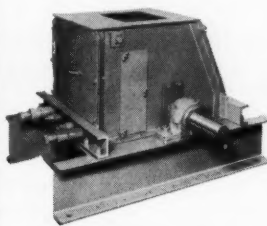
For rugged, reliable, efficient machinery you can depend upon for years — or for engineering assistance in planning or upgrading your fertilizer unit — it will pay you to consult Sturtevant. Write to STURTEVANT MILL COMPANY, 140 Clayton St., Boston 22, Mass.



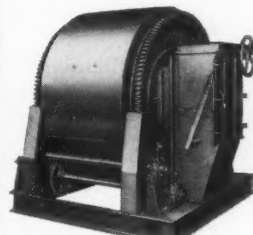
ELEVATOR



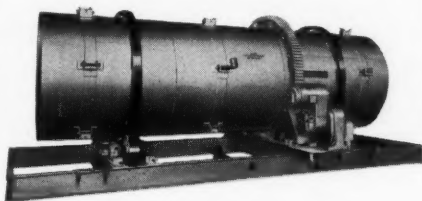
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TVA MAKES FERTILIZER DEVELOPMENT PLANS FOR '59

Planned improvements in phosphate operations at the TVA Fertilizer-Munitions Development Center at Muscle Shoals, Ala., include provisions for economical recovery of byproduct fluorine compounds. Fluorine in various chemical compounds is a strategic material with many industrial uses. It is used in large quantities in the aluminum and iron industries and in atomic energy plants. Under present conditions fluorine from the phosphate operations is neutralized to prevent atmospheric pollution and is discharged as waste. A process under development at Muscle Shoals is directed at recovering this material in a form suitable for industrial use.

TVA also is seeking methods of increasing phosphorus recovery from phosphorus sludge and waste liquors. In the nitrate plant, processes are being developed to recover hydrogen and nitrogen from waste gases.

Production and introduction of a new high-analysis phosphoric acid of a 75 to 78 per cent grade, developed by TVA, will continue during the year. During the past year four fertilizer manufacturers used about 480 tons of the superphosphoric acid in exploratory processes and mixtures, mainly liquid fertilizers. Additional firms are requesting the material for the coming fertilizer year, TVA said. This acid has great potential usefulness to the fertilizer industry, TVA reported, and this in turn holds promise of large savings to the farmer. When used to produce a liquid fertilizer containing two elements, conventional phosphoric acid can produce satisfactorily a material containing 32 per cent plant food or less, TVA said. With the new superphosphoric acid, liquid fertilizers containing nearly 50 per cent plant food will be produced for demonstration purpose.

Plans for 1959 also include

changes in present facilities to use the new acid in making a high analysis superphosphate containing about 54 per cent plant nutrient.

TVA said its plans also provide for initial production of a high analysis fertilizer using Florida leached zone phosphate as a raw material. This phosphate is in the form of aluminum phosphate—rather than calcium phosphate as in high grade ores—and is discarded as waste material in present Florida mining operations.

NEW ACIL DIRECTORY IS AVAILABLE

The Seventh Edition of the Directory of the American Council of Independent Laboratories, Inc. is available without charge upon requests, according to H. M. Dudley, executive secretary. Applications, on company letter signed by an executive, should be addressed to his attention at ACIL headquarters, 4302 East-West Highway, Washington 14, D. C.

The directory lists 500 individual services performed by testing and research laboratories.

OVER \$13 MILLION FOR WORKER IDEAS

Employee suggestion programs are gaining nationwide acceptance, says the National Association of Suggestion Systems. A survey just completed by NASS among its 1,163 members representing business and government, shows that last year 6,628,386 employees submitted 1,692,704 suggestions through formalized suggestion programs. Of this number, 25 per cent or 434,375 worker ideas were adopted and used, and employees were paid \$13,956,841 as reward.

NASS, a non-profit organization of member companies operating suggestion plans, was founded 17 years ago. The group has published a booklet, "The Suggestion Plan," a study of how to conduct an employee suggestion program. It is available without charge by writing the association at 25 East Jackson Blvd., Chicago 4, Ill.

DIAMOND INCOME, SALES UP FROM FIRST QUARTER

Net sales of Diamond Alkali Co. for the second quarter, ended June 30, 1958, totaled \$29,499,478, 10 per cent ahead of the first 1958 quarter. However, Raymond F. Evans, president, reported that for the six-month period ended June 30, 1958, sales were 10 per cent behind the corresponding 1957 period.

Net earnings for the second quarter, amounting to \$1,532,584, reflected a gain of 80 per cent over first-quarter income of \$852,820. Six-month earnings were \$2,385,404, a drop of 49 per cent from the \$4,680,412 earned during the same 1957 period.

FIRE DESTROYS CITRUS CULTURE CORP. PLANT

Citrus Culture Corp.'s fertilizer manufacturing plant at Mount Dora, Fla. was destroyed on Sept. 13, according to the *Journal of Commerce* Fire Record. Loss was said to be \$300,000.

NEW OFFICES FOR THREE COMPANIES

Acme Fertilizer Co. has moved its general offices from Wilmington, N. C., to Acme, N. C. New address is Post Office Box 98, Acme.

Berkshire Chemicals' New York City offices now are at 630 Third Avenue, Zone 17. Phone: YUkon 6-8855.

Dupont Co.'s Pacific Coast district sales headquarters for its nitrogen products section has been changed to 2930 East 44th St., Los Angeles 58, Calif.

COOP. FARM CHEMICALS PLANS PLANT EXPANSION

Plans to expand its nitrogen producing facilities have been announced by Cooperative Farm Chemicals Association of Lawrence, Kansas. Scheduled for completion Aug. 31, 1959, its ammonia plant will have rated capacity of 100 tons a day, and the urea plant, 30 tons a day of urea for use in urea-ammonium nitrate solutions.

Chemico has been awarded the contract to design and build the ammonia and urea plants.



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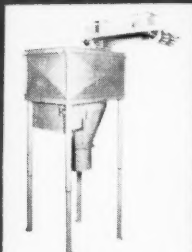
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FARM CHEMICALS

— Associations & Meetings —

CACA PANEL CONSIDERS INDUSTRY PROBLEMS

Problems of the farm chemicals industry were discussed by a panel at the Canadian Agricultural Chemicals Association convention, held September 15-17 at the Fort Garry Hotel, Winnipeg, Manitoba.

R. B. Marr, general manager of Naugatuck Chemicals Div., Dominion Rubber Co., Ltd., Elmira, Ont., looked at the problems of the manufacturer. He pointed out that only part of the \$21 million dollars worth of farm chemicals distributed in Canada are produced there. The Canadian manufacturer shares the market on these tariff-free products with large companies in other countries, he said.

The resulting low volume of production—together with serious inventory problems caused by widely separated markets and seasonal demand for products—restricts Canada's production of farm chemicals and also limits its research, Marr reported.

He suggests that availability of further statistical information to assist in forecasting, Canadian sources for more raw materials and some measure of tariff protection would have a favorable effect on pesticide production in Canada.

G. H. Nielsen, public relations, Canadian Petroleum Association, Calgary, Alberta, said the future for the marketing and manufacture of agricultural chemicals in Western Canada is very bright, and cited three major reasons:

- In the examination of the primary plant location factors the major deterrent to plant location in the West has been due to insufficient market—a situation which will begin to change rapidly

within the next few years. Plants will then be able to build in the West with a market available close at hand.

- The primary and secondary raw materials for almost every phase of agricultural chemical manufacture are available in or close to the West in large supplies.

- The trend of the farming people to demand the greatest number of chemical units for their dollar will influence plants to locate nearer the market in order to cut transportation costs to increase volume.

J. H. Elliott of Rohm & Haas Co. of Canada Ltd., West Hill, Ontario, was elected president of the CACA. Named 1st vice president was Marr; second vice-president—J. K. Brown, Green Cross Div., Sherwin-Williams Co. of Canada Ltd.; secretary—J. S. Wilson, Dow Chemical of Canada Ltd.; and treasurer—D. K. Jackson, Monsanto Canada Ltd.

MCA PUBLISHES MANUAL OF ABBREVIATIONS

A manual containing almost 300 newly recommended abbreviations for the reagent and fine chemicals field has been published by the Manufacturing Chemists' Association.

The abbreviations are intended primarily for mechanical data systems in which text space is limited, not for more technical or scientific applications. A combination of phonetics, chemical symbols and common trade usage was employed to formulate the abbreviations.

MCA Manual Sheet CA-1 is available at 20 cents a copy from the association, 1625 Eye St., N.W., Washington 6, D. C.

WEED CONTROL CONF. TO BE HELD JAN. 7-9

Research representatives from industry, colleges and government are expected to attend the 13th annual meeting of the Northeastern Weed Control Conference, January 7-9 at the Hotel New Yorker, New York City.

Papers on many aspects of weed and brush control will be presented, reports E. R. Marshall, chairman of the Public Relations Committee for the conference. Program chairman is P. Santelmann, of the University of Maryland.

NPFI SUPPORTS SOIL FERTILITY PROGRAM IN S.C. COUNTY

An intensified soil fertility program, based on soil testing and aimed at encouraging more efficient crop production by farmers through the proper use of lime and fertilizer, has been launched in Edgefield County, S. C.

Plans for the intensified project in Edgefield County, according to County Agent O. W. Lloyd, call for sampling soils in every field throughout the county. Soil tests of all samples will be analyzed at the Clemson laboratory, with Lloyd and his assistant agents outlining the lime and fertilizer recommendations for each field as indicated by the tests.

The program, supported by a \$3,500 grant from the National Plant Food Institute, is being carried out by the South Carolina Agricultural Extension Service and Experiment Station.

Outlining the purpose of the program, Lloyd and George B. Nutt, director of the South Carolina Extension Service, said farmers in Edgefield County could boost their income by \$2.5 million, simply by following soil test recommendations. The \$2.5 million figure, it was added, does not include potential increased profits from horticultural crops or milk production.

Director Nutt said the concentrated pilot project would be expanded in the future to include other counties in South Carolina, if it is successful.

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The analysis, made through Union's 5-Star Packaging Efficiency Plan, showed that the basis weight of each bag could be reduced by 20%. Another recommendation: Standardize all Multiwall styles and sizes to improve inventory control and simplify purchasing.

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CSMA TO DISCUSS LABELING AT DECEMBER MEETING

"After you spend money making the product, will your label permit you to sell it?" will be the theme of the 45th annual meeting of the Chemical Specialties Manufacturers Association, to be held December 8-10 at the Hotel Commodore, New York City.

General meeting speakers include Osgood V. Tracy, president of the Enjay Co. and vice president of Esso Standard Oil Co.; Fred C. Foy, chairman of the board and president of Koppers

Co.; Dr. Leroy F. Burney, surgeon general of the U. S. Public Health Service; George P. Larrick, commissioner, Food and Drugs, U. S. Food and Drug Administration; Dr. Leona Baumgartner, commissioner of health, New York City, and Dr. Justice C. Ward, head, Pesticide Regulations, U.S. Department of Agriculture.

CYANAMID'S SPENCE NAMED MCA SAFETY CHAIRMAN

S. F. Spence of American Cyanamid Co. succeeds G. L. Gorbell of Monsanto Chemical Co. as chairman of the Manufacturing Chemists' Association's general safety committee. New vice chairman is J. S. Queener, of E. I. DuPont de Nemours & Co.

CALENDAR

Oct. 29-31. 25th annual meeting, National Agricultural Chemicals Assn., General Oglethorpe Hotel, Savannah, Ga.

Oct. 29-31. Entomological Society of Canada and of Ontario meeting, Ontario Agricultural College, Guelph, Ontario.

Oct. 29-30. Southeastern Soil Fertility conference, Atlanta Biltmore Hotel, Atlanta, Ga.

Oct. 29-Nov. 1. American Council of Independent Laboratories annual meeting, Atlanta, Ga.

Nov. 4-6. Canadian National Packaging Exposition sponsored by Packaging Assn. of Canada, Automotive Bldg., Exhibition Grounds, Toronto, Ont.

Nov. 5-7. Fertilizer Industry Round Table, Mayflower Hotel, Washington, D. C.

Nov. 9-11. Calif. Fertilizer Association 35th annual convention, Ambassador Hotel, Los Angeles.

Nov. 10-11. Agricultural Aviation Research conference, Milwaukee.

Nov. 11-14. National Aviation Trades Assn. 19th annual convention, Pfister Hotel, Milwaukee, Wis.

Nov. 11-13. 20th annual New York State Insecticide and Fungicide Conference and 11th annual Pesticide Application Equipt. Conference, Bibbins Hall, Cornell University, Ithaca.

Nov. 16-18. National Fertilizer Solutions Assn. Convention, Netherland Hilton Hotel, Cincinnati.

Nov. 18-20. Washington State Weed Conference, Moses Lake, Wash.

Nov. 19-20. Carolinas-Virginia Pesticide Formulators Assn. annual meeting, Carolina Hotel, Pinehurst, N. C.

Nov. 20-21. Commercial Chemical Development Assn. joint meeting with National Agricultural Chemicals Assn., Lord Baltimore Hotel, Baltimore, Md. and Beltsville, Md.

Nov. 24-25. Eastern Branch, Entomological Society of America annual meeting, Lord Baltimore Hotel, Baltimore, Md.

Nov. 25. Manufacturing Chemists' Association 8th semi-annual meeting and winter conference, Hotel Statler, New York City.

Dec. 1-4. Annual meeting of Entomological Society of America, Hotel Utah, Salt Lake City.

Dec. 3-4. North Central Weed Control conference, Netherland Hilton Hotel, Cincinnati, O.

Dec. 3-4. Soil Fertility and Plant Nutrition Short Course, College of Agriculture, University of Missouri, Columbia.

Dec. 3-5. Agricultural Ammonia Institute annual meeting, Morrison Hotel, Chicago.

Dec. 8. Soils and Fertilizer Short Course, Coffey Hall, University of Minnesota Institute of Agriculture, St. Paul.

Dec. 8-10. Annual meeting of Chemical Specialties Mfrs. Assn., Commodore Hotel, New York City.

Dec. 17-18. Beltwide Cotton Production Conf., sponsored by National Cotton Council, Rice Hotel, Houston, Tex.

Jan. 7-9. Northeastern Weed Control Conference, Hotel New Yorker, New York City.

Jan. 20-22. California Weed Conference, Santa Barbara, Calif.

Jan. 21-22. Northwest Agricultural Chemicals Industry Conference, Benson Hotel, Portland, Ore.

COTTON FERTILIZER FACTS TO BE COMPILED BY NCC

Information about fertilizer application is being compiled by the National Cotton Council's Production and Marketing Div. for an annual report to the National Joint Committee on Fertilizer Application.

Principally, three special phases of fertilizer application will be covered in the 1958 report: (1) results of placement studies pertaining to rate, method and timing of applications; (2) description of new equipment for applying solid and liquid fertilizers and (3) comments on the need for new research on the placement of fertilizers on cotton and other fiber crops.

Comments on the need for new research will cover such areas as (1) timing of nitrogen applications in relation to the physiological stage of the cotton plant; (2) interactions of moisture and fertility treatments on the yield and quality of cotton fiber; (3) correcting micro-nutrient deficiencies such as zinc deficiencies; and (4) the need for more specific information on the amount of fertilizer from various sources that can safely be applied close to the seed.

A staff member of the council's production and marketing division is chairman of the Cotton and Fiber Crops Subcommittee of the NJCFA. Information included in the report is based on research during the past year at various Cotton Belt agricultural experiment stations.

MAINTENANCE & ENGINEERING SHOW SET FOR CLEVELAND

More than 300 companies will have exhibits at the Plant Maintenance & Engineering Show to be held at the Public Auditorium, Cleveland, January 26-29, according to Clapp & Poliak, Inc., producer of the event.

The show's exhibits demonstrate equipment and products to keep plants and machinery in operation. Advance registration cards may be obtained from Clapp & Poliak, Inc., 341 Madison Ave., New York City.

FARM CHEMICALS

People

American Agricultural Chemical Co. E. R. Steltzer has been named assistant superintendent at the Cincinnati plant. R. R. Treiber succeeds Steltzer at the AAC Three Rivers plant at Phoenix.

Charles T. Claxton has joined the AAC Soil Service Div. He will interpret soil reports, make fertilizer recommendations and work in sales promotion.

American Potash Institute. Dr. Robert D. Munson, formerly



Munson

in charge of the Tennessee Valley Authority's fertility-economic research projects, has been appointed agronomist for the institute's Midwest territory. Working out of St. Paul, Munson will serve Wisconsin, Minnesota, and North and South Dakota.

Atlas Powder Co. Two additions to the Chemical Research Dept. staff: Dr. Geza Szonyi to the information branch and Dr. Lee R. Walters to the organic section.

California Spray-Chemical Corp. Charles Lupshaw's appointment as district manager of the New England area has been announced by G. W. Oliver, regional manager—Northeast. From his office in Springfield, Mass., Lupsha will supervise sales operations in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and parts of New Jersey and New York.

Chemagro Corp. New mid-west sales representative is C. D. Deggendorf. His headquarters will be in St. Louis. Previously, Deggendorf held sales positions with California Spray-Chemical Corp. and Wilson & Geo. Meyer & Co.

Commercial Solvents Corp.

has named Louis L. Funk to farm chemicals marketing and distribution in the Midwest, according to C. T. Marshall, sales manager for agricultural chemicals. Funk's sales responsibilities will be in Indiana, Michigan and northern Ohio, his headquarters at the CSC Cincinnati District Office.



Funk

Frank B. Clayton has joined the farm chemicals sales staff. Working from the company's Kansas City district office, his territory includes Kansas and Nebraska. Clayton has been an agricultural salesman and field inspector for the Kansas Crop Improvement Association.

Davison Chemical Co., Div. of W. R. Grace & Co. Appoint-



Edmunds

ment of Page Edmunds as assistant general manager of chemicals has been announced. Edmunds also was named vice president of Davison Chemical Co. Ltd., Canadiana affiliate of the division.

Formerly Edmunds was general sales manager, petroleum chemicals. In his new post, manufacturing, sales and technical service managers will report to him.

Federal Chemical Co. Lawrence Farison, a graduate of Ohio State University, has joined Federal Chemical Co. as an agronomist with headquarters at Columbus, Ohio.

Hooker Chemical Corp. George C. Taylor and Daniel J. Lyons have been appointed assistant comptroller and general auditor, respectively. Taylor had been vice president-finance of Shea Chemical Corp. before its consolidation into Hooker in May. Lyons has been with Hooker since June.

The board of Marble-Nye Co., a Hooker subsidiary, has elected Thomas E. Moffitt president, succeeding R. Lindley Murray. Thomas F. Willers becomes treasurer and Alden L. Francis assistant treasurer and clerk of the corporation.

International Minerals & Chemical Corp. E. Meade

Wilson, manager of IMC's plant food operations in Florida and southern Alabama, has been awarded a 25-year merit pin. Wilson joined IMC as a field representative in Florida in 1933, was promoted to field manager and later district sales manager.

Mississippi River Chemical Co. Bernard M. Machen has been

appointed assistant sales manager. He will make his headquarters in St. Louis, Mo. and will be in charge of national accounts. He also will assist in all sales activities of the company. Machen has worked for Monsanto Chemical Co. and Allied Chemical Corp.



Machen

Michigan Chemical Corp. has named Bogardus Werth to its chemical sales staff. He goes to

HOW ABOUT YOU?

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Are you giving yourself this big advantage? Or are you taking chances with your life because of foolish attitudes about cancer like these?



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AMERICAN CANCER SOCIETY

FARM CHEMICALS

People

the company from Virginia-Carolina Chemical Corp., where he was assistant sales manager for agricultural chemicals.

National Plant Food Institute. On Oct. 1, Edward R. Schumann became a district representative, with offices at St. Paul, Minn. Schumann will work in Minnesota, North Dakota, South Dakota and Wisconsin, reporting to Zenas H. Beers, mid-west regional director. A graduate of the University of Illinois College of Agriculture, he received a bachelor of science degree in 1954 and master of science degree in agronomy in 1956.



Schumann

The Texas Co. Appointment of M. F. Granville as general manager of the Petrochemical Dept. at New York was announced recently by L. C. Kemp, Jr., vice president in charge of the department. Since joining Texaco in 1939 Granville has been a chemical engineer, process engineer, supervisor of operations and assistant superintendent at the Eagle Point Works at Westville, N. J., assistant to the works manager and superintendent of the chemicals division at the Port Arthur Works.

Union Carbide Chemicals Co., Div. of Union Carbide Corp. has realigned field personnel for its Sevin marketing and development program. J. R. Wheatley, with headquarters at Memphis, will call on cotton pesticide formulators and experiment stations in the Mississippi Delta; J. D. Mueller will move to Yakima, Wash., to help establish Sevin in fruit-growing areas of the Northwest and T. P. Finn transfers to Grand Rapids, Mich., to

cover the North Central fruit belt.

Westvaco Mineral Products Div., Food Machinery & Chemical Corp. William E. Yates, 48, resident manager of the Lawrence, Kans., plant, died Sept. 19 in Lawrence. He joined FMC in 1941 and went to the Lawrence plant when it was started in 1951.

Suppliers' Briefs

Clark Equipment Co. A facility for dealing in used fork lift trucks on a national scale has been established by the company's New York sales and service branch. It will buy, sell or trade used fork trucks of any type or make. According to John Mitchell, general manager of the New York branch, the center will be operated along the lines of a used automobile lot, except that it will trade on a national basis. Currently, about \$250,000 worth of used equipment is available at the center, located at 357 Wilson Ave., Newark, N. J.

Kraft Bag Corp. George W. Fleck, recently with Union Bag-Camp Paper Corp., has joined Kraft's sales staff. Working out of Charlotte, N. C., he will cover most of North Carolina, South Carolina and eastern Tennessee.

West Virginia Pulp and Paper Co. Charles E. Frohman has resigned as president of the Hinde & Dauch Div., upon doctors' advice. David L. Luke, president of West Virginia, will act as chief executive officer of the division until a permanent arrangement can be made.

WESTERN PHOSPHATES TO EXPAND PLANT

A \$500,000 expansion in fertilizer manufacturing facilities is planned by Western Phosphates, Inc., Garfield, Utah. The firm, a subsidiary of Stauffer Chemical Co. and Garfield Chemical and Mfg. Co., expects that phosphate ore production in its three-state area can be increased by about 10 per cent by the expansion.

FARM CHEMICALS

DAVISON INERT DUST SHOWS PROMISE AS INSECTICIDE, RELEASED FOR MORE TESTS

Experimental quantities of Dri-Die, an inert sorptive dust insecticide, have been released by W. R. Grace & Co. Davison Chemical Division, for evaluation by members of the National Pest Control Association and state and federal agricultural research groups.

The material is a treated silica aerogel, a very fine (micron-sized) white powder derived by complicated processing from sodium silicate and sulfuric acid. It has been shown to be very effective in extensive tests on roaches and wood termites and has shown promise in limited tests on houseflies, mosquitoes, ants, fleas, ticks and other insects. It acts by adsorbing the essential waxy coating which protects the body moisture of insects.

The company emphasizes that Dri-Die is still in the experimental stage and none will be marketed for general use until much further research has been completed and the proper authorization given by federal agencies.

A prospective advantage of the product, in addition to its lethal qualities, is that its action is fundamentally physical. Entomologists believe accordingly that insects may not develop the tolerances experienced with organic insecticides.

Research to date, the company reports, has shown superiority of the product not only over other desiccant powders, but over other types of insecticides—in certain applications. No harmful effects on animals have been discovered. Since the material has an amorphous—non-crystalline—structure, it cannot be a cause of silicosis.

Research with sorptive dusts as insect killers has been conducted for several months at the California Agricultural Experiment Station at Los Angeles, by Dr. Walter Ebeling, professor of entomology, and Dr. I. Barry Tarshis, assistant professor of entomology.

Dr. Ebeling's research has shown that highly sorptive clays, diatomaceous earths and silica aerogels—inert dusts—can kill some insects, such as termites, cockroaches and house flies, by adsorbing the very thin protective layer of wax, or a combination of wax and oil, that normally prevents their desiccation.

Since the inert dusts are neither poisonous nor subject (in dry areas) to a gradual decrease in effectiveness, improved formulations may threaten the market for chemical insecticides. One Phoenix, Arizona, manufacturer is selling a silica aerogel insecticide in aerosol cans. The liquid-like powder leaves a film when it dries. The company also plans to package its product in dust form, which would lower the price.

DOW BEGINS PRODUCING IMINODIACETIC ACID

The Dow Chemical Co. has begun production of iminodiacetic acid at its Midland, Mich., Div. and is believed to be the only producer of the material at present.

Iminodiacetic acid, a difunctional acid, now is available in commercial quantities. It is used as an intermediate for surface active agents, complex salts and chelating agents. Likely markets are in the textile, general chemical, pharmaceutical and plastics fields.

NICKEL COMPOUND CONTROLS WHEAT RUST IN CANADA

Wheat rust control by application of organic and inorganic salts of nickel has been achieved at the Canada Department of Agriculture research laboratory at Winnipeg, according to W. E. Sackston, plant pathologist.

Pathologists obtained excellent wheat rust control in 1956 in field plots with complex organic salts of nickel submitted by Rohm & Haas. They proved in 1957 that simple inorganic salts

of nickel, applied after the wheat was infected, could stop rust development and increase yields from field plots by eight bushels an acre. The results of 1958 plot experiments are also reported to be very encouraging. Low cost per acre is reported, but the effect of the treatments on wheat kernels has not been determined.

MEAT PACKER PAYS FOR CATTLE GRUB-FLY CONTROL

Rath Packing Co. has announced payment of up to \$1 per head to cattlemen for the cost of treating their cattle with systemic grub killers, according to Chemagro Corp. This innovation, which becomes an important factor in a national effort to rid cattle of grubs and to eliminate the annual grub-fly problem, was announced by Entomologist Earle Raun at Iowa State College. Other packers—Morrell & Co., Iowa Packing Co. and possibly Wilson—are reported to be considering similar offers, Chemagro says.

Tests conducted by Iowa State College and others with the newly developed systemic livestock insecticides, showed cattle treated with these grub killers gained one-tenth to 1/4 pound more per day than untreated cattle on the same feed. They returned \$1.23 to \$6.42 more per head when they were marketed.

The new packer offer is to stimulate use of these systemic grub killers and to permit general improvement of beef carcasses. The packer will pay up to \$1 per head on the cost of systemic insecticide treatment to any owner who delivers cattle whose carcasses contain less than five grubs per animal between December 1, 1958 and May 1, 1959.

Two types of systemic insecticides are available. One is called Co-Ral and is simply sprayed on cattle. It is equally effective in controlling screw worms, hornflies, ticks and lice, and is manufactured by Chemagro Corp. The other insecticide is called Trolene and is administered as a bolus (pill) by use of a balling gun. It is manufactured by Dow Chemical Co.

Chemicals

OKLA. TESTS SHOW VALUE OF HERBICIDES

A recent report from the Oklahoma Experiment Station at Stillwater says that in experiments there, one application of 2,4-D on strawberries at the rate of 1½ pounds per acre following fruit harvest eliminated all hand weeding for the summer season and resulted in a \$55 to \$70 per acre saving.

When Monuron was applied on asparagus at the rate of 3 pounds per acre in 40 gallons of water, all hand weeding was eliminated and higher yields of marketable asparagus were produced. Two applications were made—one prior to spear harvest and one immediately after the last harvest. The Oklahoma researchers report, however, that in 1958 a 4-pound-per-acre rate resulted in a decrease in yield of marketable asparagus due to a residue from 1957 treatments.

CHLOROPHYLL'S EFFECT ON PHYTOTOXICITY OF ACTI-DIONE ON BEAN

Water soluble chlorophyll (Na-K chlorophyllin of the N.B. cs.) reduced the phytotoxicity of Acti-dione to Pinto and Bountiful bean plants, Eugene M. Wilson of United Fruit Co. (formerly with the University of California) and Peter A. Ark of the University of California Agricultural Experiment Station said recently in the *Plant Disease Reporter*.

Phytotoxicity of Acti-dione, an Upjohn Co. product, is frequently a limiting factor in its use for the control of plant diseases. The concentration at which this antifungal antibiotic is phytotoxic varies from species to species.

The purpose of this study was to determine the influence of water soluble chlorophyll upon the margin between dosage levels of Acti-dione which gave control of powdery mildew of bean and those which injured the plant.

At 1000 ppm chlorophyll and 10 ppm Acti-dione there was no apparent phytotoxicity or reduction in fungicidal activity, the researchers reported. Chlorophyll

ORGANIC PHOSPHATES TEST BEST ON POULTRY PESTS

The most promising new pesticides for use on poultry are organic phosphorus compounds, according to two USDA scientists. Most of them are still under study to determine their effectiveness against insects, their toxicity to poultry and their residual characteristics.

Control of insects, ticks and mites affecting poultry can save U. S. producers as much as \$100 million a year, say USDA entomologists.

William C. McDuffie, ARS entomologist, has described several new methods of controlling insect pests of poultry. His report, co-authored by Robert A. Hoffman, also of ARS, was presented to members of the World Poultry Science Association at the 11th World Poultry Congress in Mexico City.

Malathion is one of the compounds that has proved highly effective against lice and certain mites. It is recommended for direct application to poultry at the rate of 1 gallon of 0.5-per cent spray, or 1 pound of a 4-per cent dust, per 100 birds. It may also be applied as a 1-per cent spray to poultry house interiors, as a 3-per cent roost paint, and as a 4-per cent dust at 1 pound per 40 square feet of floor litter.

The fowl tick, another poultry pest, can be controlled with a

1-per cent spray of malathion. Similar treatments are also effective against bed bugs, which frequently attack poultry, and the poultry bug, a related species common in the semi-arid Southwest.

Fleas may be controlled with malathion in sprays or dusts as applied for lice and mites. These treatments will kill the fleas present on the poultry, but will not prevent reinfestation unless sources of breeding can be located and eliminated.

Development of chlorinated hydrocarbons about 15 years ago led to more effective control of insect pests of poultry, McDuffie said. DDT and lindane were formerly the most widely used insecticides of this chemical group. Lindane is used in poultry houses, but DDT is no longer recommended because it creates undesirable residues in the meat. Malathion has now largely replaced these materials for controlling poultry pests.

New organic phosphorous chemicals such as Dipterex, dicapthion, Chlorthion, Diazinon, Dow Et-57 and Bayer 21/199 have appeared promising in preliminary experimental work, but additional research is needed, McDuffie said, to complete their evaluation and to determine their toxicity to poultry.

did not appear to reduce the protective activity of Acti-dione against powdery mildew. The greater portion of the Acti-dione or Acti-dione-chlorophyll apparently remained on the surface of the plant, since there was no evidence of a systemic effect.

Chlorophyll (up to 1 per cent) in aqueous solutions of 10 ppm Acti-dione only slightly reduced the inhibition of *Saccharomyces cerevisiae*.

From the experimental results, it appeared that the chlorophyll effectively widened the margin between dosage levels of Acti-dione which gave control of powdery mildew of bean and those which gave undesirable phytotoxicity.

N ON DRY LAND UPS YIELD, PROTEIN OF RANGE GRASS

Contrary to an accepted theory, the Canada Department of Agriculture says, growth of range grass in British Columbia's southern interior is not limited entirely by precipitation—even though it is as low as eight inches a year.

At the Summerland Experimental Farm, nitrogen fertilizer added to native grassland resulted in increased forage production.

It was applied as ammonium nitrate at rates of 0, 15, 30 and 60 pounds per acre.

This year these rates of nitrogen application produced 680.

880, 1,270 and 1,720 pounds of dry matter.

In terms of protein production, the results were even more remarkable. For the same nitrogen application rates, protein production was 26, 35, 56 and 107 pounds. These figures correspond to percentage protein contents of 3.9, 4.0, 4.4 and 6.2.

NEW EDITION OF HANNA'S HANDBOOK

The second edition of *Hanna's Handbook of Agricultural Chemicals* is off the press, reports Lester W. Hanna, its author.

Containing more than 450 pages, the handbook gives common and chemical names and numerical designation of fertilizers and pesticides. Other features include trivial code of entomological terms, USDA pesticide registrations, FDA residue tolerances, safety practices, and formulae, conversions and tables.

The Handbook can be obtained for \$5.95 per copy from Lester W. Hanna, Route 1, Box 210, Forest Grove, Ore.

STAUFFER SCHEDULES COMMERCIAL EPTAM PLANT

Stauffer Chemical Co. announced Sept. 18 that it has completed plans to build the first plant to produce the selective herbicide, Eptam, on a commercial scale. It is anticipated that the multimillion pound facility at Richmond, Calif., will be on stream by January, 1959.

Eptam, which chemically is ethyl di-n-propylthiolcarbamate (EPTC) was developed by Stauffer's research laboratories in 1955. During the past three seasons it has been made successively in laboratory, pilot plant and semi-commercial quantities. The herbicide has been evaluated in both greenhouse and field tests under a variety of conditions both in the U.S. and in a number of foreign countries.

The extensive experimental work which has been conducted indicates that many crops, including forage legumes such as clover and alfalfa and to vegetables such as corn, carrots and beets, are tolerant to pre-em-

ergence application of the new herbicide. The chemical, as a pre-emergence treatment, has given excellent control of many grassy weeds, including yellow and purple nutgrass, quackgrass and Johnson grass, as well as broadleaf weeds such as red-root pigweed and purslane.

Stauffer plans to market the herbicide as an emulsifiable liquid (4 lbs. per gallon) and in granule form (5 per cent and 10 per cent) for broadcast applications.

SOHIO ISSUES NEW FOLDER

A four page folder of specifications, descriptions, uses and shipping information about industrial chemicals produced by Sohio Chemicals has just been issued.

Uses of anhydrous ammonia, aqua ammonia, nitric acid, urea and nitrate solutions in the manufacture of such products as paints, varnishes, explosives, petroleum products and chemicals are included.

Also shown are uses of these products in the fertilizer and other industries. For a copy,

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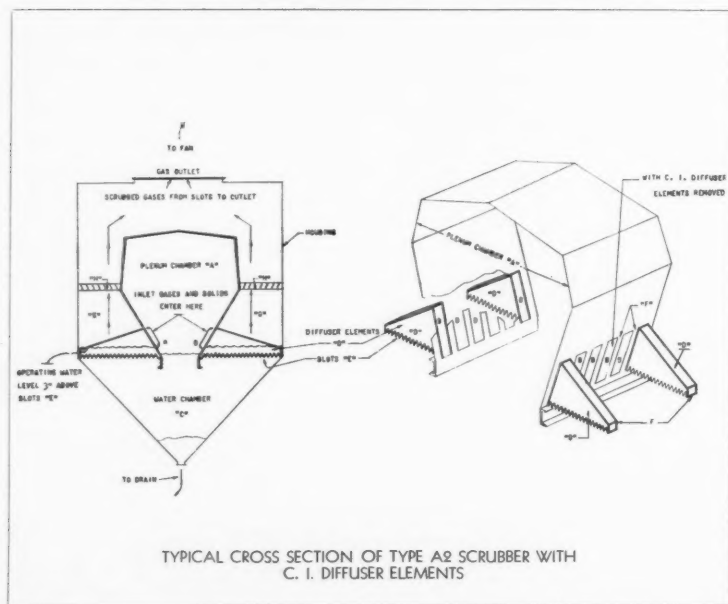
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FARM CHEMICALS

Equipment & Supplies

NEW DIFFUSER ELEMENTS ON SCRUBBER



Efficiency of its hydro precipitator scrubber dust control unit in trapping non-condensable and normal dust-type materials below five microns in size has been increased with newly-designed diffuser elements, Johnson-March Corp. says. Named the A2 Hydro Precipitator Scrubber, the unit comes in 15 sizes with capacities ranging between 500 cfm and 40,000 cfm.

The scrubber removes low- and sub-micron size dust particles, fumes and odors in fertilizer

plants. It handles gases carrying particles of nitrates and phosphates from the blending, fumes from the drying and cooling processes and odors from chemicals used to clean the equipment.

Dust is removed from the exhaust gases by velocity-reduction and water-scrubbing action. There are five stages to the process.

For further information on the scrubber,

CIRCLE 304 ON SERVICE CARD

LIQUID TOTE TANKS ADDED TO TRIAL RENTAL PLAN

Tote System, Inc. now includes 300-gallon-capacity Tote Tanks in the trial rental program it started last spring.

The tanks are said to be usable for any liquid material.

For details,

CIRCLE 305 ON SERVICE CARD

STOKES 'TORNADO' MILL

Whenever materials must be reduced in particle-size or thoroughly mixed and blended, F. J. Stokes Corp. says its "Tornado" mill can be used.

Material is ground and mixed by a cluster of whirling blades attached to a common vertical shaft. These create an air flow that throws the material outward at high velocity against a cylindrical mesh screen which completely surrounds the rotor. In the process, the material is reduced in particle-size uniformly.

For details,

CIRCLE 306 ON SERVICE CARD

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SALE: Sewing machine; Union Special tape closure machine with adjustable stand and traveling table. Richardson Bag Scale; semi automatic. Link Belt augers, some new. Roller conveyor sections, 10 foot long. Organic Compost Corporation, Germantown, Wisconsin. Flagstone 4-7000.

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RESTRICTIVE PESTICIDE LEGISLATION

(Continued from page 23)

farmers would do better to invest wisely in the chemicals that are available—rather than overcapitalize on machinery. This is of particular importance, he declares, because of farmers' increasing need to cut production costs in the present period of rising costs.

The two federal investigations now going on—by the Public Health Service, and the Interior Department—are not especially significant when considered separately. But when they are considered together with this year's "DDT Trial," their significance can hardly be mistaken, according to farm observers. Investigators of both the PHS and Interior will make reports in the months ahead—reports that are likely to make headlines.

Interior, Wildlife and Pesticides

There already is some indication of what at least one of the investigations will recommend. It is not generally known, but some officials of the Interior Department believe that mass spraying of insecticides under present methods should be abolished. This thinking manifests itself primarily in the conservative circles within the Department.

While there is every reason to believe Interior investigators will be completely impartial about their research into mass spraying effect on wildlife and fish—any such findings would lend themselves to administrative interpretation and conclusions. Furthermore, some farm leaders read a great deal of significance into the fact that the conservation-minded Interior Department—and not the Agriculture Department—was designated to run the wildlife-effect survey. They point out that Agriculture's position on pesticide use is known, whereas the Interior Department is steeped in conservation, without the offsetting effect of agricultural considerations. Whatever agricultural influence manifests itself in Interior's report to Congress will come from the rather informal connection USDA has with the investigation, through liaison officers' exchange of information.

In summing up: Washington observers believe that the farm chemicals industry is facing the possibility of new major legislation in the years ahead. The industry can expect help from NAC and the major farm organizations in keeping new laws "reasonable." ▲

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PEST REPORTS

Although the season was rather late for the majority of insects to be an economic problem, several were still quite active during late September. **Grasshoppers**, which earlier in the summer were responsible for approximately 5,000,000 acres of range, idle lands, road-

sides and public domain being treated with insecticides, were still active in widely separated areas. Early in September hoppers caused considerable damage to field corn and ornamentals in the Conesus area of Livingston County, New York. In Alabama

Presented in cooperation with the Economic Insect Survey Section, Plant Pest Control Branch, Agricultural Research Service, USDA.

grain sorghums were damaged.

During the latter part of September field margins were damaged in several counties in the panhandle of Texas and controls were applied in one area of Cimarron County, Oklahoma. In that area of Oklahoma approximately 20 per cent of the grasshopper population was being affected by the sarcophagid parasite. In New Mexico hoppers continued to be a problem in several areas. Controls were applied in Taos County and replanting of the margins of grain fields was necessary near Mosquero, Harding County. Damage to winter wheat continued in the Bowman areas of North Dakota and populations were heavy in parts of Utah County, Utah.

Damage from the **European corn borer** continued to be reported in late September. The borer was heavy in grain sorghums in Westmoreland County, Virginia with approximately 90 per cent of the stalks beginning to break at point of entry. Louisiana reported the European corn borer in the western parishes of Ouachita, Bossier, Caddo, Red River and Natchitoches while Alabama reported Tallapoosa, Elmore and Montgomery Counties infested for the first time.

The corn earworm was heavy in late field corn and grain sorghum in northern Alabama. In check plots of late sweet corn, infestations were as high as 96 per cent at Marietta, Ohio, 81 per cent at Wooster and 52 per cent at Toledo. Corn earworm damage to sweet corn in Columbia County, Wisconsin exceeded that caused by the European corn borer and fall armyworm combined. Infestation in field corn ears was almost 100 per cent in several New Mexico counties and was high in both late field and sweet corn in Utah County, Utah.

The fall armyworm was causing damage in several areas during (Continued on page 60)

Our Losses to Pests

What does damage by insects, diseases and weeds cost in the United States?

Byron T. Shaw, administrator of USDA's Agricultural Research Service, says *"Insects and diseases take close to 200 million dollars worth of fruits and nuts. They cost livestock producers 2½ billion dollars in deaths and unthriftiness. Weeds take more than 10 per cent of the grazing value of range lands and are even more costly on many cultivated and permanent pastures . . . Without question, chemicals are the most dependable weapon we have today for combatting pests quickly and effectively . . ."*

"Airplanes, spraying modern chemical herbicides, for example, are helping to clear millions of acres of weeds that could not be handled in any other way. Field studies are pointing up the advantages. In Oregon and Wyoming, the control of sagebrush made it possible to graze four times as many head of livestock on the same range."

Plant Diseases: "We are estimating that all plant diseases cause loss amounting to about *three billion dollars a year*," reports Paul R. Miller, principal pathologist of the Mycology and Plant Disease Reporting Sec-

tion, USDA. "I don't believe any one could give a good guess as to the per cent loss saved by the use of fungicides."

Insects: Dr. George C. Decker of the Illinois Natural History Survey (see cover and page 30) has said that *the productive effort of over a million men—over 10 per cent of the farm labor force—is annually nullified by insect damage*, and that the production of many crops would practically be eliminated if chemical, cultural or other methods of insect control were not employed.

Better Estimates Needed: "As well as accurately evaluating the losses caused by insects, the value of *savings resulting from insect control should be more precisely determined*," according to W. B. Fox of Chipman Chemicals Ltd., Winnipeg, Manitoba. "There are available at present only rather wild 'guesstimates' as to what insects are doing and what insecticides are really accomplishing . . ."

"It would be most interesting to see the establishment of experimental areas for the study of a complete control program, not only of insects but also weeds and disease," Fox says.

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ing the latter part of September. This insect was responsible for heavy feeding in late field corn of Kent County, Delaware and to sorghum in Eastern Shore Counties of Virginia. Heavy populations were reported from corn and sorghum fields of northern Alabama, in central Texas and on corn in Escondido, San Diego County, California.

Heavy populations of the *pea aphid* were reported from Delaware alfalfa in mid-September but were decreasing in some areas by the latter part of the month. Population build-ups were reported from areas of Nebraska, New Mexico, Utah and California.

In late September the *spotted alfalfa aphid* was reported from Oregon for the first time. There was indication of this pest building up in Nebraska but elsewhere it has not been of too great concern this season.

Among the fruit insects the *codling moth* was still active during late September. The insect was unusually heavy in the Moscow, Idaho area this year and normal practices failed to prevent infestations of fruit. Third-brood larvae were still entering fruit in large numbers in Virginia during late September. The largest third-brood in several years was in the central part of the state.

Mites were heavy in localized areas of California on cherry and pear trees, on peach trees in Oregon and apple in Utah. In Larimer County, Colorado, these pests caused tree defoliation.

The cabbage looper was one of the most important truck crop insects during September. Heavy damage was inflicted to cabbage and cauliflower in the Winter Garden area, Dimmit County, Texas, and to tomatoes in Brazos County. Lettuce was damaged in Dona Ana and Eddy Counties, New Mexico, and populations were heavy on tomatoes in the Woodland area, Yolo County, California. Earlier in the month the insect continued to be serious on cabbage and populations exceeded those of the past several years in several northwestern Oregon counties. ▲

Patent Reviews

Fc

By Dr. Melvin Nord

NITROGEN-PHOSPHORUS FERTILIZER COMPOSITION

U. S. 2,839,375 issued June 17, 1958 to Curtis G. Christian and assigned to Collier Carbon & Chemical Corp., describes a fertilizer composition containing a high proportion of nitrogen and phosphorus, produced by reacting phosphorus or phosphorus pentoxide with ammonia or mixtures of ammonia and oxygen.

A stable non-hygroscopic and odorless product is produced, which is a gray, finely-divided amorphous solid melting at 295–298°C. It is highly soluble in water, forming clear solutions having a pH of about 8. It contains about 28–30 per cent nitrogen, 28–30 per cent phosphorus, 6–6.5 per cent hydrogen and 35–40 per cent oxygen.

A modification of the process, described in U. S. 2,839,376 (same date, inventor, and assignee), yields a white finely-divided amorphous solid which melts with decomposition at 290–315°C., has very limited solubility in water and common organic solvents, has a pH value of about 8.5, and is slowly hydrolyzed by boiling water and by strong acids or aqueous basis. It contains about 21 per cent nitrogen, 32 per cent phosphorus, 4 per cent hydrogen and 43 per cent oxygen.

PHOSPHATE ROCK BENEFICIATION

U.S. 2,839,191, issued June 17, 1958 to Louis T. Monson and Roy W. Wagoner, assigned to Petrolite Corp., describes a process for the removal of siliceous impurities from phosphate rock. The process relates to the secondary or cleaner flotation circuit of a conventional flotation scheme.

The silica collector used in the present invention consists of a mixture of a high-boiling aromatic petroleum solvent and a mixture of organic compounds. It is prepared by reacting a poly-

ethylenepolyamine with tall oil, and then reacting the product with dichloroethyl ether. This reaction product is then mixed with a high-boiling aromatic petroleum solvent.

In U.S. 2,839,192, issued June 17, 1958 to Louis T. Monson and assigned to Petrolite Corp., the same reagent is applied as a collector for sylvite (KCl) from its ores.

DEFLUORINATION OF PHOSPHATE ROCK

U. S. 2,839,377, issued June 17, 1958 to Clinton A. Hollingsworth and John C. Williams, assigned to Smith-Douglass Co., Inc., describes a process for the defluorination of phosphate rock by calcination at a temperature of at least 2600° F. without substantial fusion, in the presence of water vapor and of a reagent mixture consisting of the reaction product of phosphoric acid and sodium carbonate.

U. S. 2,839,361 (same date, inventors and assignee) substitutes sodium chloride for sodium carbonate.

BENEFICIATION OF POTASH ORES

U. S. 2,839,190, issued June 17, 1958 to James E. Lawver, assigned to International Minerals & Chemical Corp., describes a process for beneficiating potash ores containing sylvite.

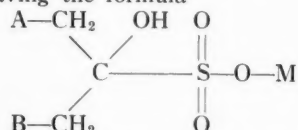
Sylvinite ore is ground and sized, and then washed with a nonaqueous, nonresidue forming organic liquid medium in which the sylvite component is insoluble. The washed ore is dried, and the washed particles are then caused to be negatively charged. The charged ore particles are then subjected to the attractive and repulsive forces of a high potential electrostatic field, resulting in a product rich in sylvite content and a product low in sylvite content.

FARM CHEMICALS

PESTICIDES

U. S. 2,840,501, issued June 24, 1958 to Lloyd J. Meuli, assigned to The Dow Chemical Co., provides a chemical for protecting crops from the ravages of soil-dwelling fungi which attack their roots.

The chemical used is a sulfonate having the formula



where A is Br or Cl, B is H or the halogen represented by A, and M is an alkali metal.

U.S. 2,840,502, issued June 24, 1958 to Joseph A. Lambrech, assigned to Union Carbide Corp., discloses the use as fungicides of new compositions of matter which are the metal and alkylamine salts, esters and sulfides of alpha-minomethylxanthic acids.

These compounds have such high fungicidal activity and such low phytotoxicity as to be useful in fungicidal sprays for those parts of the plant which are above the ground as well as in seed and soil treatments.

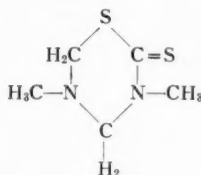
U. S. 2,840,503, issued June 24, 1958 to Richard R. Whetstone and Seaver A. Ballard, assigned to Shell Development Co., discloses a method for treatment of agricultural soils inhabited by phytopathogenic soil-borne organisms, such as fungi, nematodes and bacteria.

The treatment involves the use of substituted low molecular weight olefins characterized by the presence of several carboxylic ester substituents, or acyloxy substituents, directly substituted on the olefin residue such as 1,3-diacetoxypropene or allylidene diacetate.

U.S. 2,839,445, issued June 17, 1958 to John F. Harris, Jr. and assigned to E.I. du Pont de Nemours & Co., discloses the use as fungicides, of substituted 1,3-dithiolenes.

U.S. 2,838,389, issued June 10, 1958 to Donald M. Yoder and assigned to Union Carbide Corp.,

discloses the use, as nematocides and fungicides, of



and its diethyl analogue.

When these compounds are applied to soil, they prevent "damping off."

MAKING POTASSIUM CARBONATE, BICARBONATE

U.S. 2,837,404, issued June 3, 1958 to Alan G. Follows and assigned to Allied Chemical Corporation, describes a process for the manufacture of potassium carbonate and bicarbonate from potassium chloride, by a process which is analogous to the ammonia-soda process.

The problem involved in the process is that the reaction product, potassium carbonate $\text{KCl} + \text{NH}_4\text{HCO}_3 \rightleftharpoons \text{KHCO}_3 + \text{NH}_4\text{Cl}$ is more soluble than ammonium bicarbonate, so that it does not normally precipitate out of solution. This problem is solved in the present invention by adding a basic organic compound weaker in basic properties than ammonium hydroxide (such as pyridine). The organic compound does not undergo any chemical changes requiring costly or complex recovery procedures.

SOIL CONDITIONING

U.S. 2,838,877, issued June 17, 1958 to Kenneth C. Working, discloses a new soil additive which imparts to the soil a porous and open structure with improved water retentive properties. It is particularly useful in clay or adobe soils which cake readily.

It has been found that the aqueous acid extracts of the wood of redwood trees or the bark, wood or nuts from which tannins may be extracted yield a material which when neutralized, may be added to soil to improve its agronomic value. The neutralized extract may be employed as a water solution or dispersion, or may be dried to a powder and employed as such. ▲

Letters

FC

Washington, D. C.

This is a brief comment regarding the review of Tariff Commission figures for 1957 pesticide production on page 8 of your September issue. I am writing about the matter because of a fear that some may understand the figures to represent all U. S. production and sales whereas they refer solely to *synthetic organic* pesticides and a few other miscellaneous agricultural chemicals. Total production of pesticides would comprise also such inorganic materials as the arsenicals, copper fungicides and ground sulfur. This, I believe, would bring the figure up to 900-1,000 million pounds or thereabouts—not to mention the wetting agents, emulsifiers, solvents and dry carriers which are not in themselves pesticidal.

On the same page of the September issue the figure of 33 million tons of DDT should have been in pounds, as you probably have already noted—or been reminded.

Yours very truly,
HAROLD H. SHEPARD
Staff Specialist
Food and Materials
Requirements Div.
Commodity Stabilization Service,
USDA

Kansas City, Mo.

Both Arlan Woltemath and I were flattered to read the fine review of our talk in the September FARM CHEMICALS. We, naturally, think that this is a very important subject and thank you so much for giving it this favored treatment.

Sincerely,
DICK BALSER, Manager
Sales Promotion
Nitrogen Products
Spencer Chemical Co.

Memphis, Tenn.

Receipt is hereby acknowledged of the FARM CHEMICALS HANDBOOK, 1958, 45th Edition and we wish to express to you our deepest appreciations and sincere thanks for having mailed us the same.

We would like to compliment you on the makeup of this book and state without reservation that it certainly is a reference book that we use from day to day and is of tremendous value.

Again, thanking you very much for your kindness, I am

Very truly yours,
DAVID H. BRADFORD, JR.,
Vice President
Mid-South Chemical Corp.

Throughout the year call on Armour for

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- Triple Superphosphate
- Superphosphate
- Sheep Manure

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factories and offices!

1958

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ARMOUR FERTILIZER WORKS
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Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
E. I. duPont de Nemours & Co., Wilmington, Del.
Escambia Chem. Corp., Pensacola, Fla.
Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Phillips Chemical Co., Bartlesville, Okla.
Sinclair Chemicals, Chicago, Ill.
Sohio Chemical Co., Lima, O.
The Texas Co., New York City

AMMONIUM NITRATE

Allied Chemical Corp., Nitrogen Div., N.Y.C.
American Cyanamid Co., New York City
Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
Escambia Chem. Corp., Pensacola, Fla.
Phillips Chemical Co., Bartlesville, Okla.

AMMONIUM SULFATE

See Sulfate of Ammonia

BAGS—BURLAP

Chase Bag Co., New York City

BAGS—COTTON

Chase Bag Co., New York City.

BAGS—Multiwall-Paper

Chase Bag Co., New York City.
Hudson Pulp and Paper Corp., New York City
International Paper Co., New York City
Kraft Bag Corporation, New York City
Raymond Bag Corp., Middletown, Ohio
Union Bag—Camp Paper Corp., New York City
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BAGS—Dealers and Brokers

Ashcraft-Wilkinson Co., Atlanta, Ga.

BAG PRINTING MACHINES

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BAG CLOSING MACHINES

Dave Fischbein Co., Minneapolis, Minn.
International Paper Co., New York City

BAG FILLING MACHINES

Chase Bag Co., New York City
E. D. Coddington Mfg. Co., Milwaukee, Wisc.
Kraft Bag Corporation, New York City
Raymond Bag Corp., Middletown, Ohio
Stedman Foundry and Machine Co., Aurora, Ind.
Union Bag—Camp Paper Corp., New York City

BHC AND LINDANE

Ashcraft-Wilkinson Co., Atlanta, Ga.

BONE PRODUCTS

American Agricultural Chemical Co., N.Y.C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BORAX AND BORIC ACID

American Potash & Chemical Corp., Los Angeles, California
Woodward & Dickerson, Inc., Philadelphia, Pa.

BROKERS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N.Y.C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NOVEMBER, 1958

BULK TRANSPORTS

Baughman Mfg. Co., Jerseyville, Ill.

CALCIUM ARSENATE

American Agricultural Chemical Co., N.Y.C.

CARS AND CARTS

Stedman Foundry and Machine Co., Aurora, Ind.

CASTOR POMACE

Ashcraft-Wilkinson Co., Atlanta, Ga.
H. J. Baker & Bro., N.Y.C.

CHEMISTS AND ASSAYERS

Shuey & Co., Inc., Savannah, Ga.

CHLOROBENZILATE

Geigy Agr. Chems. Div. Geigy Chem. Corp. N.Y.C.

CHLORDANE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Velsicol Chemical Corp., Chicago, Ill.

CLAY

Ashcraft-Wilkinson Co., Atlanta, Ga.
Thomas Alabama Kaolin Co., Baltimore, Md.

CONDITIONERS

Ashcraft-Wilkinson Co., Atlanta, Ga.
H. J. Baker & Bro., New York City

CONVEYORS

Baughman Mfg. Co., Jerseyville, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

COPPER SULFATE

Tennessee Corp., Atlanta, Ga.
Republic Chemical Corp., New York City

COTTONSEED PRODUCTS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N.Y.C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

DDT

Ashcraft-Wilkinson Co., Atlanta, Ga.
Geigy Agr. Chems., Geigy Chem. Corp., N.Y.C.

DIAZINON

Geigy Agr. Chems. Geigy Chem. Corp., N.Y.C.

DIELDRIN

Ashcraft-Wilkinson Co., Atlanta, Ga.

DILUENTS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Johns-Manville Corp., New York City

DRUMS—STEEL

Vulcan Containers, Inc., Bellwood, Ill.

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Stedman Foundry and Machine Co., Aurora, Ind.

EMULSIFIERS

Emulsol Chemical Corp., Chicago, Ill.

ENDRIN

Velsicol Chemical Corp., Chicago, Ill.

ENGINEERS—Chemical and Industrial

Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

FERTILIZER—Liquid

Clover Chemical Co., Pittsburgh, Pa.

FERTILIZER—MIXED

American Agricultural Chemical Co., N.Y.C.
Armour Fertilizer Works, Atlanta, Ga.
International Min. & Chem. Corp., Skokie, Ill.

FILLERS

Bradley & Baker, N.Y.C.

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Ashcraft-Wilkinson Co., Atlanta, Ga.
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IMPORTERS, EXPORTERS

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KAOLIN

Thomas Alabama Kaolin Co., Baltimore, Md.

INSECTICIDES

American Agricultural Chemical Co., N.Y.C.
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IRON CHELATES

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Tennessee Corp., Atlanta, Ga.

IRON SULFATE

Tennessee Corp., Atlanta, Ga.

LEAD ARSENATE

American Agricultural Chemical Co., N.Y.C.

LIMESTONE

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MACHINERY—Acid Making and Handling

Monarch Mfg. Works, Inc., Philadelphia, Pa.
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Poulsen Co., Los Angeles, Calif.
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MACHINERY—Mixing and Blending

Poulsen Co., Los Angeles, Calif.
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MACHINERY

Superphosphate Manufacturing

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Sturtevant Mill Co., Boston, Mass.

MALATHION

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MANGANESE SULFATE

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METHOXYCHLOR

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MINOR ELEMENTS

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Tennessee Corporation, Atlanta, Ga.

MIXERS

Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

NITRATE OF SODA

Allied Chemical Corp., Nitrogen Div., N.Y.C.
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Bradley & Baker, N.Y.C.
International Min. & Chem. Corp., Skokie, Ill.
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NITROGEN SOLUTIONS

Allied Chemical Corp., Nitrogen Div., N.Y.C.
American Cyanamid Co., New York City
Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
E. I. duPont de Nemours & Co., Wilmington, Del.
Escambia Chem. Corp., Pensacola, Fla.
Mississippi River Chem. Co., St. Louis, Mo.
Phillips Chemical Co., Bartlesville, Okla.
Sinclair Chemicals, Chicago, Ill.
Sohio Chemical Co., Lima, O.
The Texas Co., New York City

NITROGEN MATERIALS—Organic

American Agricultural Chemical Co., N.Y.C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N.Y.C.
International Min. & Chem. Corp., Skokie, Ill.
Jackie, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

NOZZLES—Spray

Monarch Mfg. Works, Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

PAILS—STEEL

Vulcan Containers, Inc., Bellwood, Ill.

PARATHION

American Cyanamid Co., New York City
Ashcraft-Wilkinson Co., Atlanta, Ga.

PHOSPHATE ROCK

American Agricultural Chemical Co., N.Y.C.
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Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N.Y.C.
International Min. & Chem. Corp., Skokie, Ill.
Woodward & Dickerson, Inc., Philadelphia, Pa.

PHOSPHORIC ACID

American Agricultural Chemical Co., N.Y.C.
Allied Chemical Corp., General Chemical Div., N.Y.C.

PLANT CONSTRUCTION—Fertilizer and Acid

Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

POTASH—Muriate

American Potash & Chemical Corp., Los Angeles, California
Ashcraft-Wilkinson Co., (Duval Potash) Atlanta, Ga.
H. J. Baker & Bro., N.Y.C.
Bradley & Baker, N.Y.C.
Duval Sulphur & Potash Co., Houston, Tex.
International Min. & Chem. Corp., Skokie, Ill.
Potash Co. of America, Washington, D. C.
Southwest Potash Corp., New York City
United States Potash Co., N.Y.C.

POTASH—Sulfate

American Potash & Chemical Corp., Los Angeles, California
International Min. & Chem. Corp., Skokie, Ill.
Potash Co. of America, Washington, D. C.

PRINTING PRESSES—Bag

Schmutz Mfg. Co., Louisville, Ky.

PYROPHYLLITE

Ashcraft-Wilkinson Co., Atlanta, Ga.

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RESPIRATORS

Flexo Products Inc., Westlake, Ohio

SCALES—Including Automatic Baggers

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Reade Mfg. Co., Inc., Jersey City, N. J.

SPRAYS

Baughman Mfg. Co., Jerseyville, Ill.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

SPREADERS—TRUCK

Baughman Manufacturing Co., Jerseyville, Ill.
Highway Equipment Co., Cedar Rapids, Iowa

SULFATE OF AMMONIA

Allied Chemical Corp., Nitrogen Div., N.Y.C.
American Agricultural Chemical Co., N.Y.C.
American Cyanamid Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
H. J. Baker & Bro., N.Y.C.
Bradley & Baker, N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFATE OF POTASH—MAGNESIA

International Min. & Chem. Corp., Skokie, Ill.

SULFUR

Ashcraft-Wilkinson Co., Atlanta, Ga.
Texas Gulf Sulphur Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFUR—Dusting & Spraying

Ashcraft-Wilkinson Co., Atlanta, Ga.
U.S. Phosphoric Products Div., Tennessee Corp., Tampa, Fla.

SULFURIC ACID

Allied Chemical Corp., General Chemical Div., N.Y.C.
American Agricultural Chemical Co., N.Y.C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N.Y.C.
International Min. & Chem. Corp., Skokie, Ill.
Tennessee Corp., Atlanta, Ga.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SUPERPHOSPHATE

American Agricultural Chemical Co., N.Y.C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
H. J. Baker & Bro., N.Y.C.
Bradley & Baker, N.Y.C.
International Min. & Chem. Corp., Skokie, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SUPERPHOSPHATE—Concentrated

American Cyanamid Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
H. J. Baker & Bro., N.Y.C.
Bradley & Baker, N.Y.C.
International Min. & Chem. Corp., Skokie, Ill.
Phillips Chemical Co., Bartlesville, Okla.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TALC

Ashcraft-Wilkinson Co., Atlanta, Ga.

TANKAGE

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Ashcraft-Wilkinson Co., Atlanta, Ga.
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Bradley & Baker, N.Y.C.
International Min. & Chem. Corp., Skokie, Ill.
Woodward & Dickerson, Inc., Philadelphia, Pa.

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TOXAPHENE

Ashcraft-Wilkinson Co., Atlanta, Ga.

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